ALBERTA
ECONOMIC DEVELOPMENT AUTHORITY

Mega Project Excellence: Preparing for Alberta's Legacy

An Action Plan

December 10, 2004

Disclaimer

This study was commissioned for discussion purposes only and does not reflect official positions of the Alberta Economic Development Authority and the Government of Alberta.

This report contains forward-looking information on future production, project start-ups and future capital spending. Actual results could differ materially due to market conditions, changes in law or government policy, changes in operating conditions and costs, changes in project schedules, operating performance, demand for oil and gas, commercial negotiations or other technical and economic factors.

This study focuses on the issues related to enabling mega project excellence, such as cost management, project management, labour issues, infrastructure and communication and outreach. Other factors, such as environmental, geopolitical and Aboriginal land issues, are not considered and are not included in this report.

106-03384/

A Message from the Steering Committee

In May 2004, in response to requests from the Alberta Government, the Alberta Economic Development Authority (AEDA) initiated a study to develop strategies to promote mega project excellence in the Province of Alberta.

While the report, ***"Mega Project Excellence: Preparing for Alberta's Legacy* - An Action Plan",** primarily addresses issues related to the development of Alberta's oil sands, AEDA recognizes that many of the issues facing this major economic driver are similar to those faced by other major sectors of the economy in the Province.

A decade of determination and sound fiscal policy has ushered in a new era for Alberta. We are debt free, and have established a provincial financial regime that will help keep us debt free into the future. Alberta has, over the past number of years, consistently led the nation in economic growth and is likely to continue this economic growth and leadership in the years to come. The Alberta Government has developed a twenty-year strategic plan, but its success will lie in its execution. The challenge for Alberta is to use its prosperity wisely.

As we move forward in the 21st century, designing, constructing and operating mega oil sands projects will be just one of Alberta's many challenges. We will be facing similar challenges with "world-scale" investment in projects, such as pipelines, power transmission, conventional oil and gas, hydrocarbon upgrading, forestry and tourism. Coupled with these will be the existing demands to make up for past transportation and infrastructure spending shortfalls, and to expand funding in these areas as our population and economy grows.

Similarly, we will not be able to achieve the full potential of Alberta's economy if we do not have the people to do the work, fill the jobs, create new ideas and innovations, build the businesses, and drive the economy. Projected job shortages are not limited to only specific sectors of the Alberta economy and are not short term. Government, education, industry, business leaders and labour must work together to achieve the best solutions.

As we celebrate Alberta's Centennial, we can also celebrate the foresight and hard work that gave us a remarkable legacy for the Province's first hundred years. ***"Mega Project Excellence: Preparing for Alberta's Legacy* - An Action Plan"** points out some necessary directions to build on that legacy for our next hundred years.

Allan Scott
Steering Committee Co-Chair;
President and Chief Executive Officer,
Edmonton Economic Development Corporation

Irene Lewis
Steering Committee Co-Chair;
President and Chief Executive Officer,
Southern Alberta Institute of Technology

Acknowledgement and Thanks

The following people were responsible for this report.

Project Team
Greg Owen – Project Manager
Dan Kane – Writing, Research and Communications
Robert Taylor – Executive Advisor
Justine Roche – Executive Assistant, AEDA

Government Support Team
Justin Reimer – Alberta Economic Development
Patricia Armitage – Alberta Economic Development
Chris Holly – Alberta Energy
Ken Sparks – Alberta Energy
Raymond Stemp – Alberta Environment

SAIT Library Team – Zahra Razaghi, Zahina Iqbal, Michele L. Racine Stacey under the capable direction of Susan Brayford

AEDA Steering Committee
Irene Lewis – AEDA – Steering Committee Co-Chair; President & CEO, SAIT
Allan Scott – AEDA – Steering Committee Co-Chair; President & CEO, Edmonton Economic Development Corporation
Doug Neil – Executive Director, AEDA
C. E. (Chuck) Shultz – AEDA; Chairman, Canadian Oil Sands Trust
Terry Gomke – AEDA; President & CEO, Gibson Energy Ltd.
Brant Sangster – Senior Vice-President, Oil Sands, Petro-Canada

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Rick Sloan –Assistant Deputy Minister, Alberta Economic Development

Thanks to the organizations and associations listed in Appendix Two. They freely gave us their time and the research material that formed an integral part of the study.

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List of Acronyms

AEDA	Alberta Economic Development Authority
AFE	Authorization For Expenditure
AEUB	Alberta Energy Utilities Board
CAPP	Canadian Association of Petroleum Producers
CERI	Canadian Energy Research Institute
COAA	Construction Owners Association of Alberta
CII	Construction Industry Institute
EPCM	Engineering, Procurement, Construction and Management
HR&E	Alberta Human Resources and Employment
MLA	Member of the Legislative Assembly of Alberta
NEB	National Energy Board
RIWG	Athabasca Regional Issues Working Group

Executive Summary

A. Background

In May 2004, in response to requests from the Alberta Government, the Alberta Economic Development Authority (AEDA) initiated a study to develop strategies to promote mega project excellence in the Province of Alberta. The study resulted from concerns about a series of cost overruns associated with mega projects. AEDA's project mission was to facilitate communication among, and develop strategies with, stakeholders that will enhance Alberta's excellence in conceiving, designing and constructing world-scale projects.

This collaboration consisted of more than eighty interviews, in addition to numerous workshops and meetings where stakeholders shared their suggestions, ideas and opinions. The findings and recommendations in this report reflect the results of this stakeholder interaction and the analysis and ideas of the AEDA team.

B. A Need for Action

There were numerous common responses that became part of the interview lexicon when we met with stakeholders to discuss mega projects, their impact, barriers to their success, and how Alberta could achieve mega project excellence. The phrases, "a need for action", "a sense of urgency", and "a need for revolution", emerged repeatedly. Stakeholders feel we have to move quickly on the mega resource opportunity – how well we respond to the opportunity will determine *the* legacy for Albertans.

C. Putting Mega Projects and the Resource into Perspective

The oil sands resource is almost unfathomable with a bitumen volume in-place of approximately 1.6 trillion barrels and some 175 billion barrels of recoverable reserves in the ground. Today, oil sands companies produce about 1,000,000 barrels/day, enough to satisfy 62 per cent of Canada's energy needs. By 2015, oil sands production will account for three-quarters of all western Canadian production.

By 2030, potential cumulative capital spent on oil sands mega projects in Alberta could exceed $200 billion dollars and production could be up to five million barrels of oil/day. Sustaining capital expenditures and operating expenditures could total another $500 billion during the same period. This does not include other major capital expenditures such as those in the pipeline industry where it is predicted that some $10 billion will be spent on new pipeline infrastructure in the near future.

From an energy security perspective, the oil sands will play a great role in providing North America's needs – it is considered by some as "a pillar of sustained North American energy and economic security." However, the cost of developing and operating mega projects will be a challenge as Alberta competes in a global commodity environment.

Given the social and economic impact mega project activity will have on the future prosperity of Alberta, their effective development is a strategic issue for Albertans. This strategic implication is why one of our chief recommendations is for *AEDA to convene a Centennial Summit*. Since 2005 is Alberta's centennial year, it is an appropriate time to create a vision for the next one hundred years. To ensure we have a broad perspective, we recommend AEDA gather Alberta's leaders together for an open exchange of ideas on the challenges facing the Province in the next century. The issues discussed would involve a long-term economic and social plan and an energy vision for the future.

As part of that strategic outlook and lead-up to the *Centennial Summit*, a second key recommendation is for the Alberta Government to *develop a continuous cross-ministry committee to oversee an integrated government approach to focus on oil sands development.* This cabinet minister/MLA committee would ensure that Government has a broad perspective on how all departments can facilitate mega project development.

There are a number of issues surrounding mega projects that challenge this province. This report examines these and makes recommendations to move toward mega project excellence.

D. The Issues

The AEDA team interviewed project owners, associations, engineering, procurement, construction and management (EPCM) firms, economic development agencies, education institutions, senior government officials, labour leaders, project management experts and academics. The companies involved are listed in Appendix Two. As the interviews proceeded, there were distinct trends identified as barriers toward mega project excellence. These were:

- Management of Projects;
- Labour; and
- Infrastructure.

i. Management of Projects

There has been a great deal of media coverage and debate about cost overruns on mega projects in Alberta. The report goes into detail about the causes of, and perceptions about, cost overruns. The solutions to the cost challenge begin with improved project management.

Stakeholders told us that better project management will have a huge impact on their ability to achieve project excellence. Everyone also agreed that the management of mega projects was a specialized arena within the project management genre – they are complex and difficult to manage.

There is a tremendous amount of effort by industry, industry associations, EPCM companies and other stakeholders on improving project management – literally thousands of people are engaged. They have initiated measures that include:

- Strengthening their internal project management capability;
- Developing better front-end planning;
- Segmenting projects into manageable pieces; and
- Building the huge module components that make up facilities and upgraders off-site in more controlled environments closer to the labour supply.

We have recommended a number of options around project management, one of which is our third key recommendation – to have *stakeholders establish a Project Management Centre of Excellence.* Given the possible $200 billion in projected major capital projects in Alberta between 2005-2030, this province needs a centre focused on managing mega projects that will help owners, stakeholders and Alberta lead in this area.

ii. Labour

Although there is some difference of opinion, labour in Alberta may be in short supply. Even if this is not the case currently, it likely will be in future since we know there are a number of projects that soon will require thousands of workers.

Unfortunately, there currently is not a broad enough Canadian labour supply/demand model to allow stakeholders to plan for future activities. This model should apply to professionals, trades and other labour. There is, however, work underway on an Alberta model. To augment this work, the report details our fourth key recommendation that *stakeholders develop a definitive and long-term labour supply and demand model for Alberta and the rest of Canada.* The effort will require co-operation among labour, governments, industry and industry associations to complete the data model.

When completed, the supply/demand model will help Alberta develop a human resource plan that will have profound implications on:

- Industry's forecast of labour needs relative to supply;
- Advanced Education's ability to align educational programs with business needs;
- Labour's ability to adapt to emerging occupational trends; and
- Government's ability to have a long-term vision of the future for all Albertans.

iii. Infrastructure

Interviewees said that Government could play a valuable role in mega-project excellence by providing infrastructure improvements. This included improvements to highways and bridges from Fort McMurray to the development sites, from Edmonton to Fort McMurray, and from southern Alberta to Edmonton. There were also many comments that Fort McMurray is unable to respond quickly enough to the demand for affordable housing and other needs. As a result, it is difficult for companies to attract people to work and live in the community.

Of course, infrastructure needs in the Wood Buffalo Region compete with other infrastructure requirements elsewhere in the Province. We believe there is a strong business case for special treatment of this area and have included examining the business case in both the *Centennial Summit* recommendation and the *Alberta Government cross-ministry committee* recommendation.

iv. Recommendation Priorities
To summarize, our four priority recommendations are:

- AEDA convene a *Centennial Summit*;
- Alberta Government develop a continuous cross-ministry committee to oversee an integrated government approach to focus on oil sands;
- Stakeholders establish a *Project Management Centre of Excellence;* and
- Stakeholders develop a definitive and long-term labour supply and demand model for Alberta and the rest of Canada.

However, we must stress there are sixteen other important recommendations that require consideration and action. All the recommendations are summarized in Figure ES1 and are described more fully in chapter six. In that chapter, we have outlined the objective for each recommendation, along with a suggestion as to who should initiate the recommendation.

E. A Multi-Phase Process
With the tabling of this report, the AEDA team ends the first two stages of a five-stage project management methodology which included:

- Defining the issues;
- Identifying the stakeholders;
- Root-cause analysis of cost overruns;
- Identifying options for strategy and action;
- Providing solutions to issues; and
- Recommending specific actions.

In the next phases of the project, each selected option will be defined, implemented and evaluated.

Figure ES1 *Recommendation Summary*

Leader Engagement

- AEDA convene a *Centennial Summit.*
- Industry/Government convene a mega project stakeholder forum.
- Alberta Government develop a continuous cross-ministry committee to oversee an integrated government approach to focus on oil sands development.
- Stakeholders convene a Canadian Regional Forum – *Labour for the Future.*

Management of Projects

- Stakeholders establish a *Project Management Centre of Excellence (PMCOE).*
- Owners need to establish a back-to-basics approach to project management within their individual organizations.
- Owners and EPCM firms continue to take advantage of existing project management educational opportunities.
- Owners and EPCM firms continue to increase workface planning at the job site.
- Stakeholders continue work to increase modularization capacity.

Labour

- Stakeholders develop a definitive and long-term labour supply and demand model for Alberta and the rest of Canada.
- Stakeholders develop a Human Resource Plan for Alberta.
- Stakeholders develop strategies to increase labour supply in Alberta:
  - Government help young people consider an oil and gas career.
  - Government, industry and labour promote trades in schools, K-12.
  - Optimize the use of apprentices in Alberta.
  - Optimize the existing labour supply:
- Owners continue to work together to balance project scheduling.
- Governments need to continue to break down the barriers for entry of foreign workers.

Infrastructure

- Government invest further in the Wood Buffalo Region to enable oil sands mega projects.

Communication and Outreach

- Owners manage expectations with the stakeholder community about the costs of mega projects and what determines the success of a project.
- Design a communication and outreach strategy about Alberta and mega projects for critical audiences, such as the investment community, media and Albertans.

Chapter One
Mega Project Excellence: Preparing for Alberta's Legacy
An Action Plan

Project Introduction

In May 2004, in response to a request from the Alberta Government, the Alberta Economic Development Authority (AEDA) initiated this study to examine how to promote and foster mega project excellence in the Province of Alberta. The study resulted from concerns about a series of cost overruns associated with mega projects where it was identified that "several recent Alberta resource development mega projects, primarily in the oil sands sector, have experienced final construction costs exceeding the original estimated budget costs by as much as 30-70 percent."[1]

Alberta's economic future is closely tied to the cost-effective execution of the Province's world-scale projects, such as oil sands development, petrochemical facilities and pipelines. Given the social and economic impact mega project activity will have on the prosperity of Alberta, their effective development is a legacy issue for Albertans.

Effective development of mega projects is also an opportunity. As one industry leader noted:

> "Now consider the prize if Canada can take the lead in expanding energy production to meet rising global demand – demand that will be driven primarily by developing countries…The global price tag for the capital investment required to meet this rising demand has been estimated at $16 trillion…The question for Canada is, will *our* share of this growing demand be met by other nations and represent *a lost opportunity*? Or will it represent *an investment in our economy* as Canada supplies an energy hungry globe?"[2]

AEDA's role was and is to promote the collaboration of stakeholders in addressing the challenge. As such, we've interviewed and corresponded with companies, associations, constructors/designers, economic development agencies and associations, post-secondary education institutions, senior government officials, labour leaders, project owners, project management experts, and academics. They've shared their suggestions, ideas and opinions—and this report reflects those thoughts, as well as the analysis and ideas of the team involved in the project.

We have not revealed the identities of the individual stakeholders, as we promised confidentiality as part of the process. We have, however, listed the stakeholder organizations contacted in Appendix Two.

Although our interviews look back on the lessons learned on completed projects, we have also examined projects that were cancelled or are in the planning stages. The reader will

also see this report is greatly influenced by oil sands mega projects. This was not done by design. It simply reflects the activity level of oil sands mega projects. We do believe however that the lessons learned apply to *all* mega projects.

AEDA believed from the outset that while industry is responsible for addressing issues such as cost overruns, mega project excellence requires co-operation among all stakeholders. We continue to believe that all stakeholders in Alberta have a role in meeting the mega project challenge.

As one of the industry leaders stated when learning about the project and the process, "no one else can bring the stakeholders together on a problem this way in Canada or the world. Alberta, however, can."[3]

Chapter One Notes

1. Letter to Ron Triffo, Chair, Alberta Economic Development Authority, January 20, 2004
2. *Fuelling the North American Economy* by Rick George, President and CEO, Suncor Energy Inc., presentation to the Canadian Club of Toronto, Fairmont Royal York Hotel, Monday, October 18, 2004
3. Industry meeting, July 22, 2004 (name withheld due to confidentiality)

Chapter Two
Mega Projects: Alberta's Legacy

2.1 Mega Projects in Alberta

This chapter outlines the current and future roles of mega projects in the Alberta economy and shows how they are influencing the economy and what that means to Albertans.

What are mega projects? We have defined them as those projects totaling more than $500 million in construction costs. They include:

- Mining/extraction and in-situ oil sands projects, including co-generation plants;
- Oil sands upgraders/refineries in the greater Fort McMurray area, Alberta's Industrial Heartland, and other regions in Alberta;
- Large natural gas liquids and natural gas pipelines;
- Liquids pipelines connecting oil sands sources to markets – including exports to US markets to the south and potential U.S. and Asian markets;
- Gas pipelines connecting Arctic gas to southern markets, including petrochemical complexes converting Alberta's raw hydrocarbons to primary and secondary products; and
- Coke, coal gasification, or other sources, to generate electricity.

As mentioned previously, due to the large number of current (and past) oil sands projects, this study is greatly influenced by oil sands mega projects.

2.2 Overall Context – the Alberta Advantage

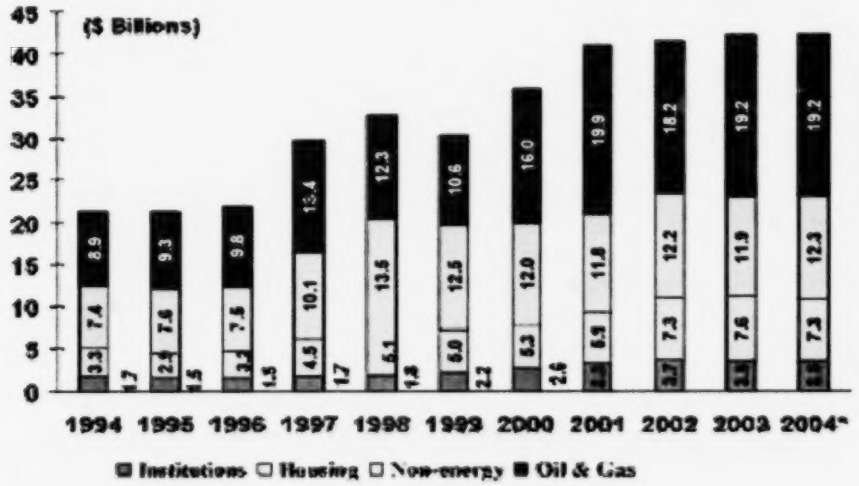
Alberta is fortunate to have a burgeoning energy economy with investment at an all-time high. Alberta's economy has expanded more than that of any other province or territory in Canada and has even outperformed the U.S. economy.[1] There are a number of reasons for this. Key among them are the available resources and the "Alberta Advantage"[2], which includes:

- A strong and diversified economy;
- A globally competitive business tax environment;
- An efficient and modern infrastructure;
- Strategic access to the North American free trade market and to north Asian markets;
- A young, skilled and productive workforce;
- The lowest overall personal taxes in Canada;
- A fiscally responsible government with no net debt;
- A government that understands and works closely with business and encourages private investment;

- Safe communities with a superior quality of life and diverse cultures; and
- Stable and predictable regulatory and fiscal regimes.

Statistically, during the last two decades, Alberta has had the highest rate of economic growth in Canada at 3.7%. The Province consistently has the highest investment per capita among all provinces. A total of $42.2 billion was invested in 2003, two-and-a-half times its 1993 level[3]. Figure 2.1[4] shows the nature of this capital investment.

Figure 2.1 **Total Investment in Alberta – Capital Expenditures**



*Intentions
Source: Statistics Canada, Alberta Economic Development

As we shall see, Alberta is on the cusp of change in its hydrocarbon-driven economy—evolving gradually from conventional oil and natural gas to unconventional sources such as the oil sands.

2.3 Conventional Oil and Gas Currently Dominates

Conventional oil and natural gas activity is currently the chief fuel behind Alberta's turbo-charged economy. The Canadian Association of Petroleum Producers (CAPP), the voice of the Canadian upstream oil industry, estimates capital spending in Alberta in 2003 at $20.5 billion with $15.5 billion coming from conventional activity and $5.0 billion coming from oil sands.[5]

Alberta Economic Development and Statistics Canada generally agree with these numbers. Figure 2.2[6] highlights the total spending in Alberta and the role oil sands and conventional oil and natural gas play in that capital spending.

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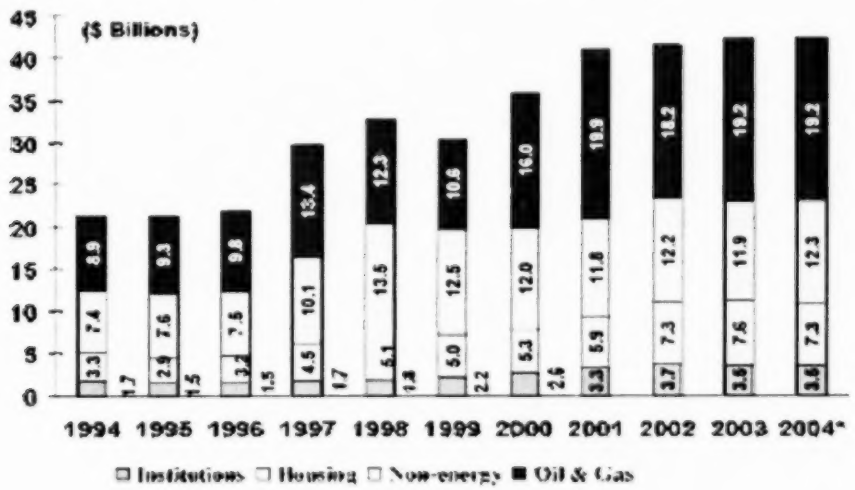

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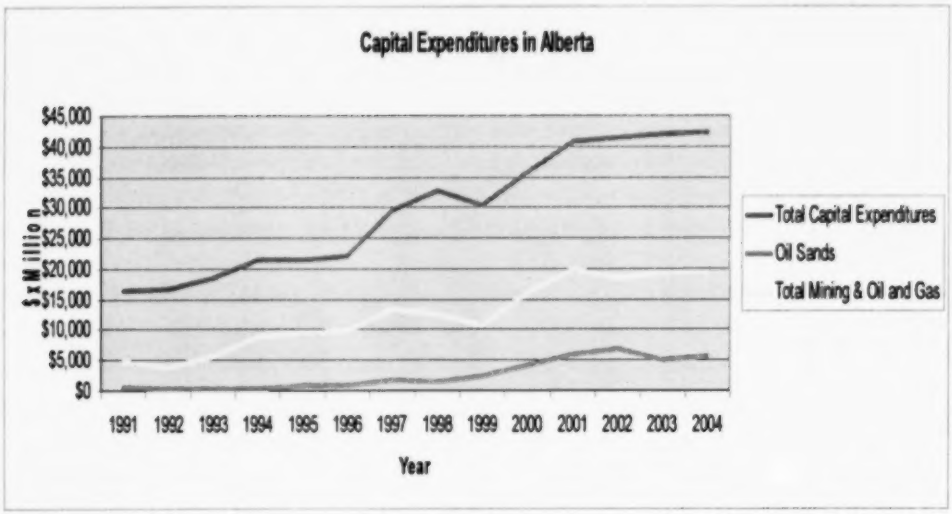
Figure 2.2 **Capital Expenditures in Alberta**



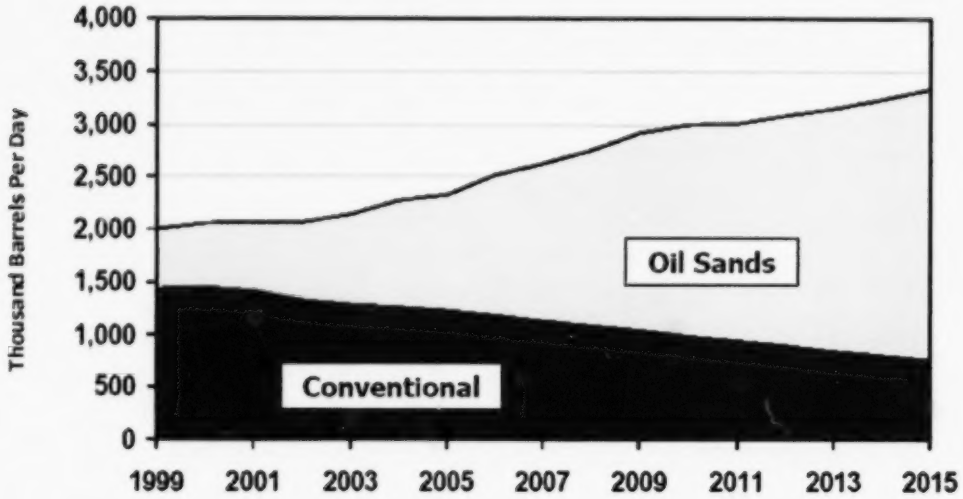
2.4 The Age of Oil Sands Soon to Arrive

In their report *Oil Sands Supply Outlook, Potential Supply and Costs of Crude Bitumen and Synthetic Crude Oil in Canada 2003-2017,* the Canadian Energy Research Institute (CERI) indicates that "Alberta's oil sands is considered the linchpin for Canada's energy future, with dwindling conventional crude production from the Western Canada Sedimentary Basin (WCSB) and expectations that WCSB natural gas production will soon begin to decline."[7]

This observation is corroborated by CAPP which anticipates a shift in production, investment and returns from oil sands activity. Their analysis shows "oil sands production has surpassed one million barrels per day and with 175 billion barrels of reserves in the ground, it is one of the few basins in the world with growing production. Companies expect to produce 2.9 million barrels per day of bitumen and synthetic light crude oil by 2015."[8] CAPP also indicates that "oil sands production currently makes up roughly half of total production, however, by 2015 it will account for three quarters of all western Canadian production and will have grown at an average annual rate of 9.6% in that same time period."[9]

Figure 2.3 demonstrates the production relationship between conventional and heavy oil in the period 1999-2015.

Figure 2.3[9B] **Conventional vs. Oil Sands Production: 1999-2015**
(moderate case)



Source: CAPP

The oil sands are also predicted to provide long-term revenues for Albertans. Figure 2.4 models the annual royalty forecast based on two different oil price per barrel scenarios. It shows royalty revenue at approximately $2.5 billion/year by 2024.

Figure 2.4 **Alberta Oil Sands Royalty Payments Forecast**

Source: RIWG

2.5 Mega Projects and Oil Sands Outlook – What the Experts Say

There are numerous outlooks for the future of oil sands. Although their forecasts differ to some degree, they generally paint a positive picture of oil sands activity over the next ten to twenty years.

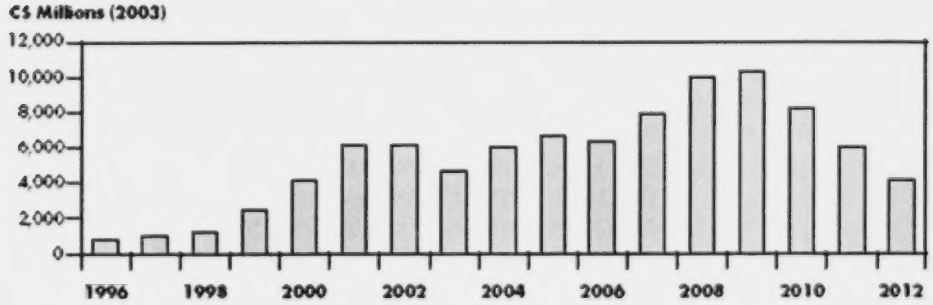
A. Canadian Energy Research Institute (CERI)

CERI indicates that "at year-end 2003, there were 19 major oil sands projects that were either operating or under construction in Northern Alberta. Nine of these projects began operations prior to 1999, while the remaining projects either started operations since 2000 or are expected to startup by 2005. In addition, there are 16 major projects that have either made applications to the Alberta Energy and Utilities Board (EUB) or been approved by the EUB for the Athabasca and Cold Lake oil sands areas. Investments on these projects would total C$21.8 billion if all of them move forward...Public disclosures or announcements have been made for 13 more potential projects, accounting for another C$28.1 billion of potential oil sands investments. The lion's share of projects applied for, approved, or publicly disclosed, are in the Athabasca oil sands area and have targeted commencement of production within the next decade."[10]

B. National Energy Board (NEB)

The National Energy Board closely corroborates CERI's assessment of total capital expenditure. "Some 44 new bitumen recovery projects or expansion projects have been announced, 18 mining and 26 in situ, to be implemented in the 2004 to 2012 time frame. Capital expenditure of about $60 billion will be required to construct these projects."[11] (see Figure 2.5)

Figure 2.5 **Total Capital Expenditures – Oil Sands Projects**



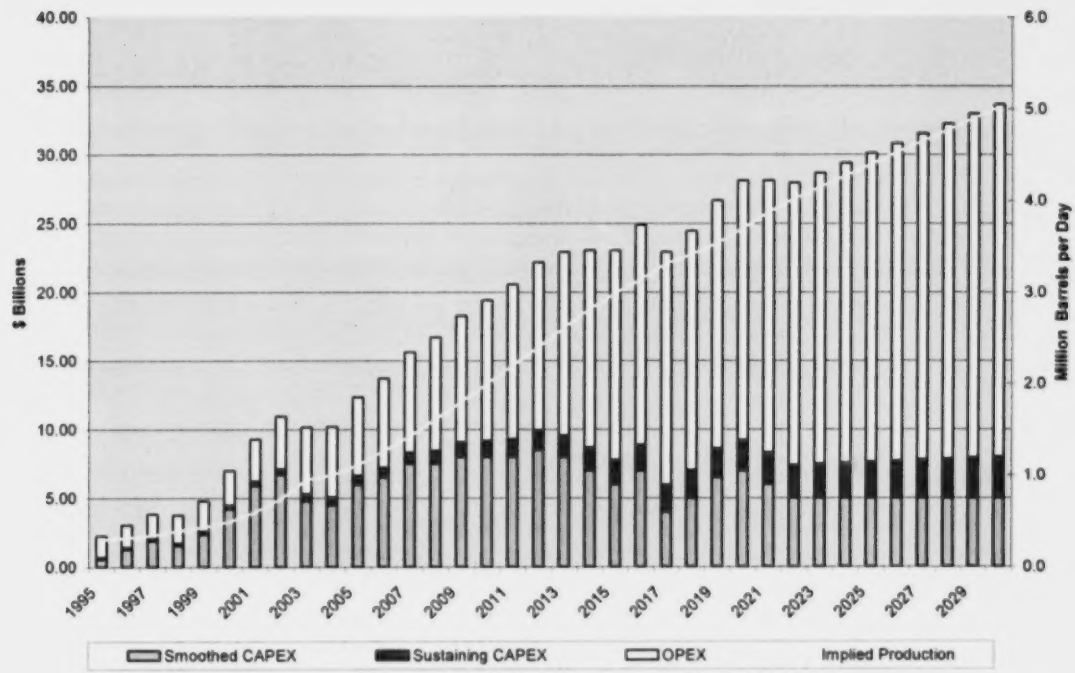
Source: NEB

The NEB also indicates that "in addition to the 33,000 currently employed by oil sands development, it is predicted that the oil sands will create a total of 102,000 jobs across Canada by 2012, for a total of 2.7 million person-years of employment over 25 years."[12]

2.6. A Capital Look to 2030

For a more encompassing model of the expenditures related to oil sands, it is helpful to look at the capital expenditure, operating expenditure and the capital needed to sustain oil sands activity during a long time period. Figure 2.6[13] demonstrates one scenario for potential oil sands expenditures in Alberta from 1995-2030. The graph indicates that to get to a forecast production level of 5 million barrels/day by 2030, the potential cumulative capital (the spending shown in blue in Figure 2.6) to be spent on oil sands will be more than $200 billion dollars. Sustaining capital expenditures and operating expenditures (the spending shown in red and yellow in Figure 2.6) could total another $500 billion during the same period.

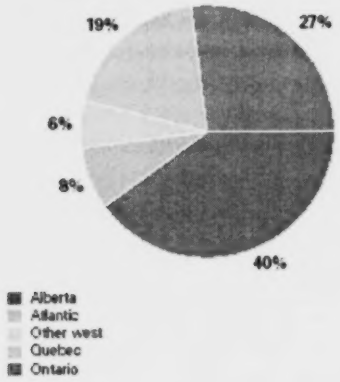
Figure 2.6 **Oil Sands Future Spending**



Source: Infinite Scope Management

Although the capital expenditure will have a dramatic impact on Alberta, it will also greatly impact the rest of Canada. Figure 2.7 demonstrates the investment sharing that occurs in Canada because of oil sands development. Beyond Alberta, the rest of Canada shares 60 per cent of the investment in the oil sands.

Figure 2.7 **Canada-Wide Investment Sharing**



Source: NEB/OSTRM (1995)
Alberta Chamber of Resources Oil Sands Technology Roadmap, January 30, 2004

2.7 Other Mega Projects

In addition to expenditure on the oil sands projects, there will be major capital projects in the pipeline sector. The Canadian Energy Pipeline Association indicates that "Canada needs to invest an estimated $10 billion in new pipeline infrastructure in the next few years. Maintenance capital will become an increasingly larger share of total infrastructure investment with an estimated $12 – $15 billion for Western Canada over the next thirty years."[14]

Potential projects include the Mackenzie Valley Pipeline, Alaska pipeline and various pipeline projects being examined to transport synthetic crude to the United States and overseas. They also include new power plants and major additions into the north-south energy grid.

2.8 Mega Projects – Alberta's Future Legacy

The economic data and energy outlook makes it clear that Alberta's prosperity – and its future legacy – lie with mega projects. The "legacy" term implies the huge potential contribution the oil sands and other mega projects will have for the people of Alberta and the rest of Canada.

Consider this quote:

> "The phrase, 'resources beyond belief', has often been used to describe Alberta's oil sands. With an estimated initial volume in-place of approximately 1.6 trillion barrels (260 billion m^3) of crude bitumen, Alberta's oil sands are one of the largest hydrocarbon deposits in the world."[15]

We have developed fewer than 10 per cent of the oil sands reserves to date and have more than 90 per cent that could be exploited. If development goes ahead on that scale in the coming decades, it will require billions of dollars of capital investment.[16]

Alberta has a tremendous opportunity to exploit these resources and lay the foundation for prosperity. There are some challenges, however:

- Oil sands products compete against lower-cost conventional oil;
- The development of an oil sands project can take up to eight years from project start to finish. This longer duration makes projects more susceptible to the many changes that may occur over this period;
- Oil sands mega projects compete for investment capital worldwide against other investment opportunities; and
- At some point, other energy supply sources may be more attractive.[17] For example, scenarios prepared by the World Energy Council estimate that renewable energy will account for 15 – 25 per cent of global energy supply by 2050.[18]

We do know, however, that investors are currently keen to invest in the oil sands for a number of reasons:

- The abundant oil supply in an era of perceived shortage;[19]
- Proximity to the United States – a huge market concerned about its energy security. The U.S. calls the oil sands continued development "a pillar of sustained North American energy and economic security"[20];
- Emerging markets such as China who are looking at the oil sands as a long-term energy source; and
- Low political risk – Alberta has demonstrated it is a good place to invest capital.[21]

We must ensure we maintain a sense of urgency for their development. Included in that, of course, is a search for mega project excellence – the key for future prosperity in Alberta. That is why it is important to look at the issue of cost overruns and the underlying factors and assumptions behind them. The next chapter details those findings.

Chapter Two Notes

1. Alberta Economic Development www.alberta-canada.com
2. Ibid
3. Ibid
4. Ibid
5. CAPP website, www.capp.ca
6. Alberta Economic Development, www.alberta-canada.com and Statistics Canada.
7. *Oil Sands Supply Outlook, Potential Supply and Costs of Crude Bitumen and Synthetic Crude Oil in Canada 2003-2017,* Canadian Energy Research Institute (CERI) …Executive Summary, p. xvii.
8. CAPP *Crude Oil: Western Canada - Oil Sands - Offshore*
9. CAPP Canadian Crude Oil Production and Supply Forecast 2004 – 2015 -- p.3

9B. Ibid Chart 3: Conventional vs. Oil Sands Production: 1999-2015 Moderate Case –id Chart 3: Conventional vs. Oil Sands Production: 1999-2015 Moderate Case

10. CERI , Chapter 5, p.41
11. *Canada's Oil Sands, Opportunities and Challenge to 2015, An Energy Market Assessment,* May 2004 (National Energy Board) section 4.4, p. 25
12. Ibid, p. 73 (see also Athabasca Regional Issues Working Group)
13. Source of the graph: Infinite Scope Management. Assumptions: Smoothed CAPEX is the base driver of the spreadsheet and has been force fitted to reach ~3 million bpd by 2015 and ~5 million bpd by 2030. Capital efficiency = $40,000/bpd fully upgraded; Operating expense = $14.00/bbl fully upgraded with energy inputs @ ~$5/GJ; Sustaining capital = 1.5% of cumulative capital.
14 Canadian Energy Pipeline Association presentation , *Transmission Pipeline Overview,* www.cepa.org
15. CERI, p. 1
16. The EUB in "*Alberta Reserves 2003 and Supply/Demand 2004-2013*", Section 2 report the Initial Recoverable Reserves to be 178.7 billion barrels for Alberta (Table 2.1, p.2-2) and the Initial Established Reserves to be 646.4 million m^3 and 1741 million m^3 for in situ and mineable respectively [Table 2.5 P.2-8 and Table 2.4, p.2-6 respectively]. If one assumes that these reported "initial established" numbers roughly translate into "developed" [they likely both need significant incremental capital to fully develop them, but these are the only number we have], this translates into 15 billion bbls of "initial established" from an "initial recoverable" total of 178.7 billion, or 8.4%.
17. One competing interest may be renewable energy. Material renewable energy competition may be 20 – 50 years away. Lord John Browne, chief executive of BP p.l.c. states in a speech entitled *Restoring Energy Security* (Sept. 17, 2004) at the OPEC Internations Seminar in Vienna, Austria:

"Today, beyond hydro, all the renewables and alternative forms of energy supply provide just 2.5 per cent of world demand. Research on renewable and alternative fuels continues. We, and many others, are part of that process. But in almost every case we are still at the stage of research and experimentation. We believe renewables will provide material supplies of energy in the long-term. But the long-term could be 20, 50 or more years away."

18. World Energy Council, *Global Energy Scenarios to 2050 and Beyond,* (1999-2004) p. 5 http://www.worldenergy.org/wec-geis/edc/scenario.asp
19. Lord John Browne, Chief Executive Officer of BP in a speech entitled *Beyond Insecurity – The Future of the World Oil Market* (27 October 2004. Oil and Money Conference) states:

"As prices have risen – from $29 a barrel a year ago, to $33 six months ago to $50 today – the concern about energy security also has risen. Will there be more political disruptions to supply? How high could prices go? The concern begins with a short-term worry and then grows as people think about the longer term future.

Are there enough reserves? Will people be able to invest enough to meet growing demand? With production declining in some of the established OECD producing areas such as Alaska and the North Sea, can we be happy to become ever more dependent on oil supplies from countries with different political and value systems? Are we right to depend on oil? Could it be replaced and if so, how soon?

Now we have reached the situation where the need to escape from oil is the subject of books, newspaper editorials and political debate.

We're told that the era of oil is coming to an end and, of course, many see that as a good thing because as well as being insecure for political reasons, oil is seen as being environmentally dangerous."

20. U.S. *National Energy Policy*, May 2001, p. 8.8

21. The Fraser Institute has "concluded that Alberta is the best place in Canada in which to invest because of provincial policies around taxation, fiscal prudence and infrastructure." Calgary Herald Article, November 10, 2004, *Alberta posts 'singular' productivity growth*, p. D3 (Geoffrey Scotton)

Chapter Three
Alberta Mega Project Cost Overruns: Perceptions and Reality

3.1 Background

Mega project cost overruns have cast a grey cloud over an otherwise optimistic forecast about the future of mega projects in Alberta. Although the concerns have lessened in the era of plus $40 (U.S) oil, they nevertheless are highlighted by the media and the investment community and scrutinized and agonized over by management in the companies that have invested (or will invest) in Alberta mega projects. The cost overrun issue also affects the reputation of Alberta as a good place to invest, with some analysts predicting that "half of the projected $50 billion investment being contemplated for oil sands could be cancelled or delayed in the next five years, mainly because of capital cost concerns."[1]

One media report sums up popular perceptions of the cost overrun issue: "Midway through a 20-year expansion that's supposed to drive production of the heavy bitumen contained in the oil sands from under 500,000 barrels per day, Canada's oil sands producers have already overspent by at least $7.3 billion dollars" and "numerous other oil sands projects still at the planning or proposed stages...will be jeopardized. If that happened, then we could say goodbye to billions in profits for shareholders, billions more in provincial royalties and federal income taxes, plus tens of thousands of jobs."[2]

There are a number of myths that surround Alberta's mega projects that affect perceptions of the Province among a variety of audiences. The media has a tendency to propagate these myths and because the media has such great power in shaping the way in which others see the Province, it is worthwhile to look at the myths and contrast them to the realities of Alberta.

3.2 Separating Reality from Myth for Alberta Mega Projects

A. Investment continues to flow

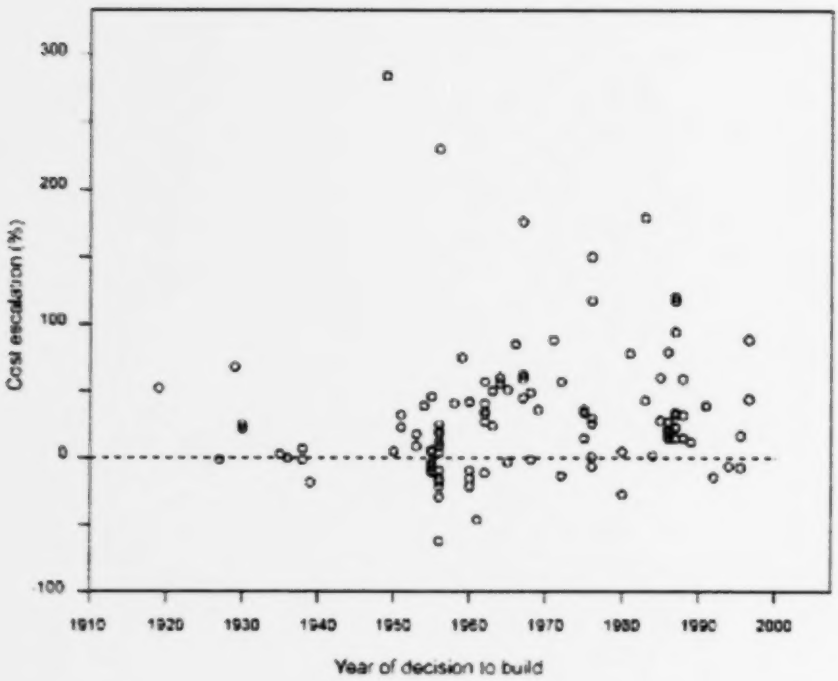
The first myth is that due to cost concerns, investors are not investing in mega projects in Alberta. In fact, investments continue to flow into Alberta mega projects. Companies have invested more than $30 billion dollars since 1995. This includes billions of dollars invested after the announcement of cost overruns. In 2004 alone, it is expected that investment will reach $5.5 billion[3] with many other international investors actively pursuing investment opportunities. Both scenarios indicate that cost overruns, although of concern to investors, are not stalling investment.

B. Alberta matches worldwide performance

The second myth surrounding this province's mega projects is that cost overruns are an Alberta-only problem. This falsely reinforces the view that Alberta is not a good place to invest in mega projects when compared to other parts of the world. In fact, an analysis of 111 international transportation mega projects constructed between 1910–1998 indicates

that costs have been consistently underestimated. *Figure 3.1* portrays the inaccuracy of cost estimates over time.[4]

Figure 3.1 Inaccuracy of cost estimates in transportation projects over time, 1910–1998 (fixed prices, 111 projects).



This information points out that managing costs on mega projects is an issue that is not restricted to Alberta. On the contrary, the mega project cost overrun issue is a worldwide phenomenon.

C. The True Measure of Success

The third myth created by media coverage of Alberta's mega projects is that the only measure of success for these projects is cost. There are other success measures which include: [6]

- Project functionality;
- Contractor commercial performance; and
- Project Management.

In Alberta's case, the constructed mega projects are functional; that is, the facilities in place are safe, use state-of-the-art technology, meet all regulatory standards and produce

nearly 1,000,000[6A] barrels/day. The pipelines perform equally well, safely transporting almost two-thirds of Canada's total energy supply.[6B]

The oil sands mega project production results are a technological triumph – the results are a positive case study for the merits of Alberta's technological research. The existing oil sands production is enough to satisfy 62 per cent of Canada's current daily needs[6C] and comes from an unlikely and humble source historically called "that gum or pitch which flows out of the banks of that river."[7]

In terms of contractors' commercial performance, there is mixed data about how well contractors have benefited from mega project activity. However, it is clear that the volume of work currently generated in Alberta will benefit the EPCM companies over the long-term.

One issue that is not covered widely but is likely the greatest indicator of project success is the safety of mega projects. Safety is a priority for all producers and contractors in the Province. The good news is that the mega projects have done well from a safety perspective, with millions of person hours invested without a lost-time accident.[8]

If there is an issue related to success measures, it is likely within the project management arena. We will discuss what we heard on this in the next chapter, but first we need to examine the myth surrounding cost overruns.

D. Cost Overruns or Cost Underestimation?

The fourth myth concerns cost overruns. As we will see from the interview summaries in the next chapter, some owner companies indicate that many of the reported cost overruns are not overruns but actual costs. This is a confusing sequence of events that is linked to when estimated project costs are reported externally to regulators, the media and the investment community.

There are two examples where this occurs.

Companies issue media statements announcing projects (which include project costs) early in the process. This creates expectations that the announced costs should be the actual costs for the project. However, the announced project cost estimate is prior to detailed engineering and usually is only a scoping estimate.

In another example, the Alberta Energy Utilities Board (AEUB), as part of the project approval application process (Guide 23), requires companies to submit their project costs.[9] The AEUB has a public interest mandate when approving projects to ensure that the project is in the best interest of all Albertans. This includes economic benefits.

As part of their economic evaluations, the AEUB looks for a "reasonableness test"[10] that includes considerations such as:

- Do the projected capital costs look in line with other similar projects? and
- Will the proposed project likely have positive economics at the projected product prices?

When a company is ready to submit an application to the AEUB, it will only have completed a small amount of detailed engineering. As a result, any cost estimates submitted will still be a high-level estimate. Since the AEUB application cost estimates are public, this again creates expectations that the announced costs should be the actual costs for the project. Any subsequent "extra" costs, no matter what the cause, are reported as "cost overruns."

The management of external expectations is an important issue both for investor confidence and the reputation of Alberta mega projects since it blurs the distinction between getting the cost estimates right and completing the project for what it should cost.

3.3 The Cost Reality and a Sense of Urgency

Despite the confusion of whether cost overruns are actual costs (or not), mega project owners did not deny that cost overruns are an issue. All stakeholders (including owners) involved in mega projects have examined the causes of cost overruns and are using those lessons to avoid repeating the mistakes.

There is a great sense of urgency about moving toward project excellence. This activity involves literally thousands of people. The next two chapters of this report will review what AEDA heard from stakeholders about the lessons learned and the actions being taken to ensure mega project excellence in Alberta.

Chapter Three Notes

1. CERI *Oil Sands Supply Outlook*, chapter 8.3, page 93
2 *The Money Pit*, by George Koch, (page 68) *National Post Business Magazine*, July 2004
3. Statistics Canada (catalogue #61-205 and #61-206), Alberta Economic Development
4. *Underestimating Costs in Public Works Projects Error or Lie?*
Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl
Journal of the American Planning Association, Vol. 68, No. 3, Summer 2002, p. 282.
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5. Source: NPT - National Post, Oct. 27, p. FP1 , Financial Post by Claudia Cattaneo
6. *The Question of Success and Failure, The Anatomy of Major Projects, A Study of the Reality of Project Management*, Peter W. G. Morris and George H. Hough), Major Projects Association, Templeton College, Oxford (page 193)
6A. CERI, page 138
6B. Canadian Energy Pipeline Association, http://www.cepa.com/frameset.htm?industryfacts.htm,1,2
6C. CAPP conversation
7. Athabasca Regional Issues Working Group, http://www.oil sands.cc/publications/history.asp
8. As one example, Shell's AOSP has 56 million hours worked with "best in " safety – sourced from presentation to the Canadian Insitutute, *EPC Mega-Project Management*, Ramzi Fawaz, Calgary, September 27, 2004. The Shell Upgrader in Fort Saskatchewan have 6 million hours, Suncor Millennium had 5 million hours; Syncrude had 4.6 million hours; and Albian Sands/MRC Fort McMurray had 3 million hours – source: "*Labour Productivity and Project Auditing System*," George Jergeas, Canadian Institute seminar, September 27-29, 2004
9. AEUB *Guide 23*: http://www.eub.gov.ab.ca/bbs/products/guides/g23.pdf
10. AEUB interview (senior management)

Chapter Four
Stakeholder Interviews: What We Heard

4.1 Background

As discussed in the first chapter, AEDA's role in this project was and is to promote collaboration among stakeholders to address the mega project excellence challenge. This work included interviews and correspondence with project owners, associations, engineering, procurement, construction and management (EPCM) firms, economic development agencies, education institutions, senior government officials, labour leaders, project management experts and academics. More than 80 interviews, meetings and workshops were held during a four-month period.

This chapter relates what they told us about why cost overruns occurred. The interesting part of the process was that 'patterns' began to emerge from the discussions we had with the variety of stakeholders. This chapter outlines those patterns. They include:

- Management of Projects;
- Labour;
- Infrastructure; and
- Planning.

We must stress that although we have categorized these patterns and trends, none stands in isolation. Rather, they are intertwined and co-dependent, forming a complex and evolving dynamic. Where applicable, we have added research commentary to help us define and describe the issue.

Although this chapter stresses the lessons learned from projects, we do not want to leave the impression that mega projects are in a sorry state. This chapter is not about the failure or shortcomings of mega projects; rather, it is about the sharing of lessons to improve future project performance.

4.2 Management of Projects

A. Background

There is a great deal of evidence from the interview process that better project management will have a huge impact on the owners' ability to achieve project excellence. All basically agreed on the definition of project management as "the application of knowledge, skills, tools and techniques to project activities to meet project requirements."[1]

Everyone also agreed that the management of mega projects was a specialized arena within the project management genre. This seemed especially true as soon as a project exceeded the $500 million figure, a key reason why this study examined only those projects over $500 million. As Edward W. Merrow, an expert in the field of mega project management analysis, stated:

"Megaprojects have a number of characteristic traits that are closely associated with many of the headaches that are presumed to accompany very large projects. Megaprojects tend to stretch available resources to the limit (and sometimes beyond) – resources such as labour, supplies of bulk materials...managerial skills, and information systems. Megaprojects are often built in areas with inadequate basic infrastructure, i.e., transportation, communications, housing, and health and sanitation facilities."[2]

B. The Complexities of a Mega Project

Why are mega projects so complex? Consider these facts[3]:

On a two and one-half billion dollar project, the engineering effort:

- Can consume over 3.5 million person hours;
- Will produce 40,000 - 50,000 design drawings and handle 10,000 - 20,000 vendor and shop drawings;
- Provides 15 million construction hours using a labour force of 6,000 to 8,000; and
- Each job requires a combination of the correct materials, location, access, tools, construction equipment, scaffold, safety concerns, quality concerns, consumable supplies, welding, rigging, x-ray and many other inputs to allow the worker to get the job done.

C. Project Management Issues

The following are the common issues and "patterns" identified by the many interviewees. We believe these patterns represent the key lessons learned. They will form part of the solutions outlined in the last chapter.

i. Front-End Planning, Project Definition, Execution Strategy

The owners recognized, and contractors confirmed, that there was insufficient front-end planning, project definition and scope definition. This occurred because of the tremendous cost associated with the planning and front-end engineering (front-end planning can cost over $500 million and is in itself a mega project) along with the tendency of project proponents to want to begin the project quickly.

Experts have said that "poor project definition at the time an estimate is made is the most important source of faulty estimates."[4] One interviewee confirmed this by observing that one key part of his project was well defined but other aspects were not. As a result, initial definitions ballooned as the project proceeded, including labour that escalated from the planned initial 3,500 people to a peak of 6,000 people. This severely affected the economics of the project.

Interviewees also suggested mega projects require a solid execution strategy before launching the project. This describes the various plans for labour, contracting arrangement and transportation, among others. It also specifies if the project is to be cost-, schedule-, or functionality-driven. A well-defined execution strategy provides

the project team with the high-level direction needed to describe the project's detailed execution plan.

ii. Cost Estimation

Both owners and contractors discussed at length the process of creating cost estimates. Scoping-cost estimates prepared in a project's early stages are more "art" than engineering. However, once they are made public, they tend to become the 'benchmark' costs for the life of the project. For example, scoping-cost estimates are usually completed with very little engineering design and are +/- 40 per cent.

Later, in the engineering design specification phase where companies complete about 20 per cent of the engineering design, this refined cost estimate will be +/- 15 per cent. Finally, even with completion of 100 per cent of the engineering design, the cost estimate accuracy will still be +/- seven per cent (usually in all these cases, it is more plus than minus). As we mentioned in the previous chapter, this cost estimation issue is a major source of the confusion behind what is (or is not) a cost overrun.

An example of the cost estimate confusion is a recent external update from one company whose project had not been given Board of Directors (BOD) sanction. In that case, the company announced an updated (and increased) cost estimate based on more detailed engineering. The headline for the news article was, "*...costs go sky high: Oil sands overrun hits $2.1B.*"[4A] Yet all the company was doing was announcing what they thought were projected costs for a project that had not yet started construction. How can you have a cost overrun on a project that has not been given approval for expenditure from its BOD?

The need for accurate mega project cost estimates is vital to their successful execution. If a project starts with an inaccurate scope definition and cost estimate, it will be designed for too few workers, will result in too small a site, and lead to inadequate support facilities such as camps, elevators and transportation capacity. As the project proceeds and the realistic project needs are revealed, managers are forced to increase resources on site to meet the project schedule. Over time, changes like these become a huge contributor to the eventual cost overrun.

iii. Workface and Site Planning

Workface planning is "the process of organizing and delivering all the elements necessary, before work is started, to enable workers to perform quality work in a safe, effective and efficient manner."[5] Workface planning means that workers will have the necessary materials, equipment, tools, drawings, information and communication to do the job.

On many of the projects, owners and contractors agreed that workface planning was lacking and that better planning is the key to better on-site labour productivity. As one owner stated, "the logistics of keeping many thousands of people productively working on a site needs to be planned. You can't have thousands of people waiting for one elevator to go to work."[6]

One interviewee concluded that the main issue with cost overruns on past mega projects was poor or non-existent workface planning. He claimed that site worker productivity today is one-quarter to one-third of what it was on one of the original oil sands projects he worked on. He indicated this could be improved through better workface planning.[6A] Items associated with the issue are:

- Work packages for the day's jobs are deficient or non-existent. Workers arrive at the site and supervisors are not equipped to direct them to their tasks for the day. The interviewee felt that with proper work packages, labour productivity would increase from the current 30 per cent to 65 per cent efficiency; and
- Labour densities are not properly calculated to determine how many workers can effectively work in a given area of the site. Crew densities usually require 300 square feet per person on site. If they do not have it, productivity suffers.[6B]

These observations correlate with the findings of the Construction Owners Association of Alberta (COAA), which represents a broad cross-section of owners' interests and is associated with many sectors of the Alberta construction community, construction services and other activities. The COAA is committed to examining the issues facing the Alberta construction industry and delivering practical solutions to safety, workforce and project challenges.[7]

Figures 4.1 and 4.2 summarize their analysis of workface planning: the current situation and how it can be improved (the 'size of the prize'). Their conclusion is dramatic – *10 per cent of tool time improvement is a 27 per cent improvement in productivity.*[8] This is the equivalent of adding thousands of people to Alberta's workforce. The COAA is continuing ongoing research in this area.

Figure 4.1

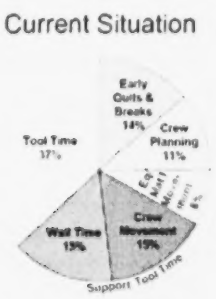
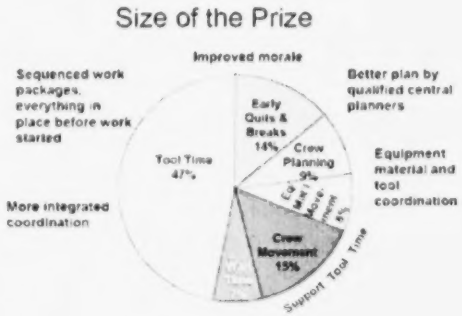


Figure 4.2


Size of the Prize
Improved morale
Sequenced work packages, everything in place before work started
Better plan by qualified central planners
Early Quits & Breaks 14%
Crew Planning 9%
Tool Time 47%
Equipment material and tool coordination
More integrated coordination
Crew Movement 15%
Support Tool Time

Source: COAA

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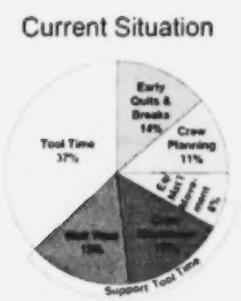

Figure 4.2

Size of the Prize
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Better plan by qualified central planners
Early Quits & Breaks 14%
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Tool Time 47%
Equipment material and tool coordination
More integrated coordination
Support Tool Time

Source: COAA

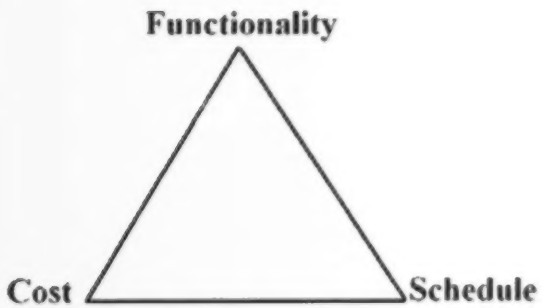
iv. Balancing Project Priorities

Project priorities generally are a balance of four things: safety, functionality, cost, and schedule. However, since safety is such an overriding priority on all projects, safety performance is not compromised at any stage of a mega project. Interviewees indicated it is rare for a project to achieve all three of the other priorities; most only achieve two.

In the majority of cases, functionality is the key priority since every project owner wants to ensure their facility delivers the expected volumes of product. Companies with low margins tend to focus on cost and will sacrifice schedules to meet those costs. Others, such as oil sands producers, are usually schedule-driven which means that the companies will sacrifice costs to meet the schedule.

Figure 4.3 is a simple diagram that outlines these project dynamics.

Figure 4.3 ***A Project Priority Model***



v. Scope Change

Scope change is defined as "any discretionary change in the size or configuration of a project."[9] Those interviewed identified scope change as a key contributor to increased costs. The nature of scope change is such that it results in an exponential ripple effect that affects project cost and schedule.

The interviewees agreed it was ideal when the detail design was frozen once approved. In reality, scope changes on these types of projects are inevitable, so it is important to have a rigorous change management process that will control costs.

vi. Professional Staff

Project Managers

Both owner companies and EPCM companies interviewed indicated that the lack of project management expertise was a contributing issue to cost overruns. Two themes emerged:

- An inability to find experienced project managers; and
- Owners outsourced project management to contractors.

From the early 1980s to the 1990s, there were very few major projects in Alberta. Industry lost a whole generation of project management experience. As a result, there remains a scarcity of experienced project managers and related expertise. This is an important issue given the investment growth in the Province. Capital expenditures in Alberta have grown from $16 billion in 1991 to $42 billion/year in 2003. This capital escalation has greatly increased the demand for project managers. One interviewee put this into perspective:

> "Mega-projects take five-plus years from start to finish. This means experienced project managers do four or five of these projects in their working careers (considering that they don't usually start as project managers when graduating from university). The result is that there are not that many people around who have the knowledge and experience to run these mega projects. In addition, academic training is not enough to be able to manage and execute projects. You need good training with an EPCM firm to develop the skills and experience to be able to manage these projects."[10]

The owners and the contracting companies recognize that the owners have to assume more responsibility for the management of projects. Currently, many of the owner companies are staffing and strengthening their in-house project management teams, with one company currently employing more than three hundred in their project management organization.

Engineers
The quality of people is critical to the success of projects. "First-class engineering" was often mentioned as a critical success factor. Interviewees indicated they could not secure enough experienced engineers to help manage, design and execute the projects. One project manager noted "the shortage of lead engineers has, in current projects, increased field rework…to over 10 per cent in some project areas."[11]

This issue was defined even more clearly by one of the project owners who indicated "engineering capability in Alberta to do these projects is limited. Engineering on (my) project ended up being done in 15 different shops around the world. There might be enough engineering capability in all of Alberta to do one project at a time."[12]

Planners
Planners are responsible for creating and realizing the path of construction and the logistics for a project.[13] One interviewee suggested that planning is a science, while project management is an art. His view was that in-depth planning on projects in Alberta is weak. His experience was that most think that schedulers are planners when they are not. They are skilled information systems people who know how to use a scheduling system and in most cases do not have experience in planning fieldwork.

Again, industry lost many of its planners during the 1980s and 1990s and is still struggling to fill that gap. The resulting "lack of experience and knowledge has created management schedules without proper logic and schedule control functionality. On mega projects, this situation has impaired effective decision-making or risk mitigation processes or both."[14]

vii. Vendor management
Many of the interviewees indicated that quality control of fabrication of large equipment is lacking. They mentioned that vendor activities need to be managed and controlled like a sub-project.

viii. Risk Management
Interviewees suggested that the risk management process used on mega projects was inadequate. They suggested that once risks were identified and mitigation plans defined, they should be periodically reassessed throughout the life of the project. In one case, owners engaged third party risk analysis firms to discuss risk analysis with the EPCM company rather than having direct communication. This hampered communication. Interviewees suggested that the risk management process should be jointly agreed upon and executed by owners and the EPCM firms.

ix. Benchmarking

Benchmarking is a highly respected practice in the business world. It is an activity that looks outward to find best practices and high performance and then measures actual business operations against those goals.[15]

On some of the projects, owners used a world-class benchmarking model that did not anticipate future cost overruns for some project owners. In one project, an owner company used the model that indicated it had best-in-class performance on the front-end of their project. However, when the project was completed, the costs were 75 per cent higher than announced costs.

The interviewees suggested that the process might not have worked for several reasons:

- A lack of Alberta-centric benchmarking data; and
- A failure to understand the application of the process.

The COAA is sponsoring further research on benchmarking to provide a model that will meet Alberta's project requirements.

x. Project Organization Structures

It is a common process in Alberta for owners to outsource project work with the EPCM (service) sector which provides project management, engineering, procurement, and construction expertise. This, again, is a reflection of the evolution of the industry given the amount of downsizing that occurred in the 1980s and 1990s in the Western Canadian Sedimentary Basin.

Given the nature, size and complexity of mega projects, owners require service companies of a certain size to handle the projects. There are few service companies in Alberta that can do that by themselves. In Alberta, it is also a common practice for owners to use no more than one-third of a service company's capacity for a single project, which limits the ability to do a project with a single EPCM provider. And, given the number of projects occurring simultaneously, this further narrows the availability of these service companies.

As a result, it was not an unusual practice for the mega project owners to create an alliance structure of service companies that would distribute risk, blend expertise and create an organization that was capable of handling the mega project. This was a model that worked well in the North Sea.

Conceptually, the model was a creative solution to the issue of size and capability. But, as the interviewees indicated, the model contributed to cost overruns. Reasons given were:

- Multiple owners, different corporate cultures and different accounting systems all add to project complexity;

- Engineering, procurement and construction contractors were not designed to work together effectively since they have different cultures and information systems for scheduling, materials management and procurement. As a result, many of the contractors had to learn new systems and processes – all while trying to learn and adapt to a new culture;
- The tendency toward concensus decision-making and lack of leadership. There were two observations made about this point:
  - Mega projects need a single project manager for effective decision-making.
  - In the execution stage, mega projects need an autocratic command and control decision-making model.
- Cost allocation to numerous parties added work and complexity. It also contributed significantly to overhead burden; and
- Lack of collaboration by the numerous constructor organizations.

4.3 Infrastructure

When mega-project stakeholders were asked about the role government could play in mega project excellence, many cited infrastructure improvements.

A. Roads and Highways

Infrastructure improvements suggested by interviewees include improvements to highways and bridges from Fort McMurray to the oil sands sites, from Edmonton to Fort McMurray, and from southern Alberta to Edmonton.

The scale of the loads hauled is worth noting – one owner indicated that on their multi-year project, 20,000 truckloads of material was sent over the highway from Edmonton to the site.

With increased activity, these loads will increase in number and size in the future. Consider that on one project alone, the owner plans to move 1,500 oversize modules in 2005/2006 on a two-lane highway to Fort McMurray.[16] Looking more broadly, industry predicts it will ship 7,080 oversize modules in the south/north transportation corridor by 2010.[17]

B. Fort McMurray Factor

Many observed that the City of Fort McMurray is unable to respond quickly enough to the demand for affordable housing and related community needs. As a result, it is difficult for companies to attract workers to work and live in the community. This was a major concern for all interviewed.

Other factors[18] include:

- Lengthy bus/car travel times every week with little or no compensation;
- Work weeks with little overtime;
- High cost of living in Fort McMurray; and

- For jobs in the Edmonton-Calgary corridor, it was mentioned that lack of sufficient Living Out Allowance (LOA) and travel allowances limited the attractiveness of area jobs to construction workers from other Canadian provinces.

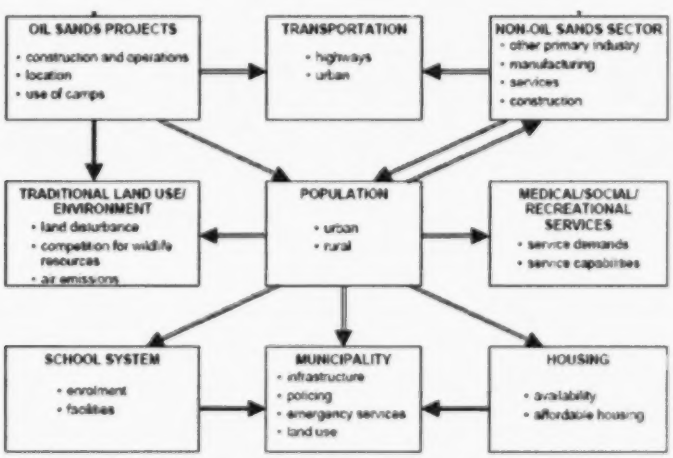
There will also be the extra weight that the numerous worker camps (for the next ten to twenty years) will put on infrastructure for Fort McMurray and area.

One engineering and procurement company indicated it has ten years of major project work scheduled for the future and could, if facilities allowed, place 1,500 new workers in the city of Fort McMurray. It costs $120/person day to provide camp facilities.[19] They added that having the right facilities would reduce pressure on overtime requirements that camp workers demand. A study completed in October 2003 about the Wood Buffalo Region (Fort McMurray and area) underlines the concerns expressed in the interviews:

> "Information…suggests that the region's infrastructure needs may reach $550 million over the next five years….There is likely to be a funding gap of at least $100 million – and possibly as high as $195 million – over the 2003-2007 period….The cost of living in Fort McMurray is well above the provincial average, with housing costs being particularly high, inflating the costs of infrastructure projects. The high costs also reduce real funding levels in the region in those cases where provincial support levels are based on standardizing province-wide rates. This, in turn, exacerbates the difficulties of attracting and retaining staff, accentuates capital funding pressures, and reinforces social disparities in respect of low-income households."[20]

Figure 4.4[21] illustrates the complex interrelationships that must be managed when planning for oil sands activity in the Wood Buffalo Region.

Figure 4.4



Source: Alberta Economic Development

4.4 Labour

A. Labour Shortage?

Labour[21A] in Alberta is perceived to be in short supply by most, but some pointed out that past projects always managed to find enough workers. They thought that any labour shortages were caused by ineffective use of workers due to poor planning.

Is there a labour shortage?

The Canada West Foundation in its recent report, *Willing and Able: the Problem of Skills Shortages in Western Canada*, suggests:

> "With labour intensive projects like the 2010 Winter Olympics coming to BC, significant investment planned for Alberta's oils sands, the development of two uranium mines in northern Saskatchewan, and Manitoba Hydro's Wuskwatim dam project, there is likely to be no new wiggle room in the western labour market over the coming years…In general, there is mounting evidence to suggest a growing problem with skills shortages in certain sectors and certain regions of western Canada. Questionnaire responses from 76 industry associations across the West present a snapshot of the regional skills gap: 62 associations have indicated that skills shortages exist in the current labour market and 73 associations expect shortages to exist over the next five years. These shortages are the most acute in the health care and the skilled trades occupations (especially in rural and remote areas)."[22]

Industry indicates there is an issue and is looking for ways to solve the problem such as getting labour from beyond Alberta, in the rest of Canada and internationally.[23] Others believe that there is also a shortage of skilled labour.

> "Labour costs are a constant topic of discussion in Fort McMurray, the epicenter of Alberta's oil sands industry. Furthermore, analysts claim that the high demand for labour in the Fort McMurray area has led to dilution of the workforce and the use of lower-skilled workers, and has hurt productivity. With a number of megaprojects competing for skilled trades people, a shortage of labour quickly escalates into a skills crisis. The shortage of qualified engineers and supervisors seems to be a more pressing problem."[24]

B. Productivity

Interviewees did not reach consensus on labour productivity. Some indicated that labour productivity was a key contributor to cost overruns on the projects. Others indicated that any productivity issues were linked to management's inability to provide the conditions for workers to be productive.

The latter point is agreed to by some owners and the EPCM companies. One project management academic suggests that proper management of labour productivity can be both a source for productivity improvement and a solution to the perceived labour crunch described earlier.

A recent media report sums up his findings:

> "The 20 mega-projects that have been executed in Canada, including offshore projects, while successful, have all experienced 20-100% cost/schedule overruns. They have had a shortage of skilled labour, lower-than-anticipated productivity and high labour turnover, with much of the blame placed on workers' shoulders."
>
> "If we are going to blame lower productivity on workers we are missing the boat...The blame is on management... Currently only 37% of mega-project workers' time is spent constructively working – what he called tool time. The rest of the time they are waiting around (15%), moving as a crew (15%), quitting early or taking breaks (14%), planning as a crew (11%) or moving equipment and/or material (eight per cent). But with better management, involving sequenced work packages and everything in place before work is begun, tool time could be increased to 47%, wait time reduced to seven per cent and planning time cut to nine per cent."[25]

This is similar to the observation made by the COAA in section 4.2.

C. Union/Non-Union

There is a sense within the owner constituency that union contracts lack the flexibility required by the mega project environment. This is also reflected by contractors who indicated there needs to be constructive competition between union and non-union. As part of addressing the flexibility issue, the owners are looking for the optimal work schedules–they have seen that different types of schedules appeal to workers better than others.

Unions are aware that there is competition to provide labour for mega projects. They are looking for solutions for many of the challenges that owners discussed, such as flexibility in the contracts, absenteeism, and better supervision. One union leader in his presentation at a recent labour conference reminded his members, "we expect the owner and contractor to live up to their promises, shouldn't they expect us to do the same?"[25A]

4.5 Long-Term Planning

Planning for the long-term requires cooperation between stakeholders and a realization that this cooperation is necessary to enable a long-term strategy. During our interviews, we identified two areas where we heard that this co-operation needs to be strengthened.

These areas include:

- Labour supply and demand modeling; and
- Capital forecasting by industry and impact on Government.

A. Labour Supply/Demand Model

Alberta and the rest of Canada do not have a labour supply/demand model that is broad enough to measure current and future demand for labour relative to the emerging supply of labour. This applies to professionals, trades and other labour.

Alberta's Human Resources and Employment is working hard to paint the supply/demand picture and preparation of a model is underway.[26] However, the model is a work in progress and is limited to Alberta. Industry, labour and others across Alberta, the rest of the Western provinces and Canada need to work with Government to supply the information Government needs for the model. As the Honourable Clint Dunford, Alberta's former HR & E Minister, stated recently at a conference:

> "The Department needs to know what skills the industry needs in order to help. Some Companies are keeping this information close to their vests. This is not helpful. The Department is prepared to assist in developing some type of Industrial Resource Plan… It's time you put your mind and some of your money into developing a sophisticated Resource Plan. If you want the Government's help, it needs your information."[27]

There are, of course, efforts underway. The COAA participates in, and is a lead sponsor for, a labour demand forecast for the construction industry. The project is called the *Construction Workforce Supply Demand Forecast 2004-2008*, which is an "outlook for selected construction-related trades in Alberta."[28] The study is the result of a collaborative effort involving the COAA, Alberta Economic Development, Alberta Learning, Alberta Human Resources and Employment, and major representatives of Alberta construction contractors and labour organizations."[29] Figure 4.5[30] outlines a table from the *Forecast* that delineates trades requirements for major industrial projects $50 million and over. The numbers represent thousands of workers.

In the report, the COAA indicates "the aging of our construction workforce will become more of an issue in many trades. By the end of…2007/2008 we expect that we will see a large percentage of experienced tradesmen, either leaving the trades, or changing the way they participate in the industry… Our supply of workers during peak periods continues to be largely dependent upon workers from other provinces…"[31] The COAA also indicates that they are working with other provinces to gather their data on the supply of construction workers.

Figure 4.5 **Trades Requirements for Major Industrial Projects (Thousands of Workers)**

	2004	2005	2006	2007	2008
Boilermakers	0.4	0.6	0.5	0.3	0.1
Bricklayers	0.1	0.1	0.1	0.1	0.0
Carpenters	1.1	1.5	1.3	1.0	0.8
Cement Mason	0.2	0.2	0.2	0.1	0.1
Drilling Occupation	0.4	0.3	0.3	0.2	0.2
Electricians	1.1	2.6	3.2	2.3	1.6
Insulators	0.8	1.0	1.0	0.8	0.8
Iron Workers	1.4	1.7	1.7	1.3	1.1
Labourers	1.5	1.7	1.6	1.4	1.1
Millwrights	0.5	0.4	0.4	0.3	0.1
Operating Engineers	1.6	1.9	1.9	1.6	1.2
Other Occupations	1.7	1.9	1.9	1.7	1.1
Plumbers - Pipefitters	2.4	3.2	3.3	3.1	2.4
Sheet Metal Workers	1.0	1.2	1.1	0.9	0.6
Supervisor and Support	1.5	1.6	1.6	1.4	1.0
Welders	0.7	1.0	0.8	0.6	0.3
TOTAL TRADES	**16.6**	**20.8**	**21.1**	**17.1**	**12.5**

Source: Construction Workforce Supply Demand Forecast

B. Capital Planning

One of the hoped-for outcomes of this study is a long-term look at the number of projects and capital expenditures to 2025. Alberta Economic Development has the data for announced projects planned for the next five to eight years. However, there was no long-term capital project forecasts because industry limits their announcements to projects expected to be completed in the near term.

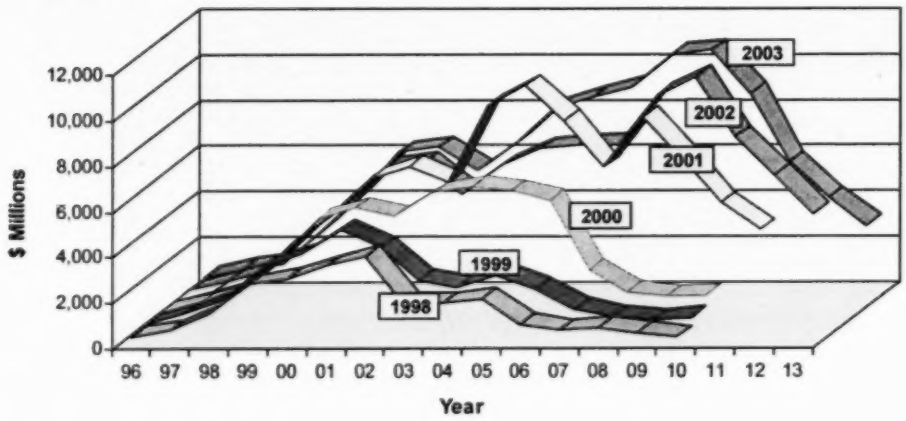
The project team used a chart similar to Figure 4.6 to outline to senior government officials the forecast capital expenditures for the next decade. The team explained industry's view that Government should provide the necessary infrastructure to enable oil sands development. One senior official examined the graph information and said, "infrastructure takes years to plan and by the time I can do anything, it looks like the capital spending will be over by 2010."[32]

It is easy to understand that if the bulk of capital expenditures are complete in five to eight years, Government does not have the necessary business case to proceed with costly *infrastructure investment. Government needs* better capital spending data to allow it to determine priorities and enable long-term planning.

A typical industry forecast based on announced projects is shown below in Figure 4.6. This is not the likely outcome since industry, to obtain their production forecast of three–five million barrels/day in the future, will need to spend billions of dollars over the next twenty years. However, examining the pattern of announced projects over time indicates that the industry's forecast numbers continually meet or surpass those of the previous year's forecast. To overcome the limitations imposed by the lack of forecast data, the chart in chapter 2 (Figure 2.6) was created to better represent the forecast of oil sands spending.

The Government might find the scenario modeling approach used in Figure 2.6 useful in their planning for infrastructure improvement.

Figure 4.6 **Annual Oil Sands Capital Expenditure Forecast**



Source: RIWG
*Based on all announced projects proceeding – includes cogen, pipeline, and oil sands projects

4.6 The Search for Solutions

It is very apparent that those involved in mega project development have analyzed project performance and are looking to improve project performance. In the next chapter, we will examine what various stakeholders are doing individually and collectively to achieve mega project excellence.

Chapter Four Notes

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14. Ibid
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18. Mike Percy presentation, *Alberta's Economic Growth and the Building Trades*, September 14, 2004 presentation to Alberta Building Trades Council
19. Interview
20. *Wood Buffalo Issues Report and Recommendations* Regarding a Submission by the Athabasca Oil Sands Developers Facilitation Committee, prepared by Alberta Municipal Affairs and the Wood Buffalo Interdepartmental Committee with Nichols Applied Management, October 16, 2003, p. ii.
21. OIL SANDS INDUSTRY UPDATE. prepared by Alberta Economic Development, March 2004, p. 10
21A. When we discuss labour in this report, we are not limiting the term to trade labour, both union and non-union. Depending on the context, the term may also include professional labour such as engineers.
22. Canada West Foundation, http://www.cwf.ca/abcalcwf/doc.nsf/publications?ReadForm&id=4E800CBF1331378887256E9900480112
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25A. Panel – ABTC Conference, Robert R Blakely Canadian Building Trades, September, 2004
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Chapter Five
Stakeholder Interviews: Actions Underway

5.1 Background

There are literally thousands of people in the stakeholder community working every day to improve mega project performance. This chapter outlines some of the efforts underway. Those efforts are in four areas:

- Management of Projects;
- Labour;
- Co-operative Initiatives; and
- Government efforts.

5.2 Management of Projects

A. Internal Project Management

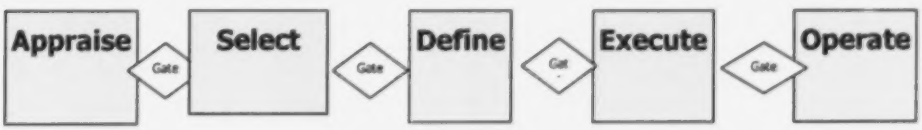
Without exception, owner companies are strengthening their in-house project management teams to manage their projects better and to become more accountable for results. As there is a shortage of project management professionals in Alberta, securing this talent has involved a worldwide search.

B. Project Scope, Definition and Stage Gating

Companies have learned they must be more rigorous on front-end planning for their projects. In an example given to us by one of the owners, the company spent hundreds of millions of dollars and four years of analysis before asking its Board to sanction the project.

The stage gate approach used by most project owners consists of a number of phases. At each phase, the project team must go through a "stage gate" where they have to satisfy certain criteria prior to moving on. The model below (Figure 5.1) depicts a typical five-step process – the first three steps are the "front-end" load phases of the model.

Figure 5.1 **Five Stage Process Model**



Owners intend to have a much better definition and assessment of project size, scope, and complexity before sanction. As part of this process, they will exercise more control over both cost estimating and cost control on future projects. They expect to improve the

precision of cost estimates from +/- 30 per cent to +/- 10 per cent before taking the AFE forward for approval.

C. Contracting Arrangements

There is no standard contract for mega projects between the owners and the EPCM companies. However, the COAA has recognized the need to standardize contractual arrangements for the industry and has developed a contract model that they expect to present to industry in 2005.

To attain cost certainty and minimize risk, some owners are experimenting with different types of risk-sharing contracts with their EPCM counterparts.

D. Contractors

Owners are diversifying their contractors, looking for size and bench strength. They are looking worldwide for the contractors – one owner is asking contractors from Japan, Italy and the USA for bids. They feel contractors from these countries are capable of handling more risk because they are financially strong and their business is much larger and more diverse than local firms.

E. Project Segmentation

Since mega projects are so complex, owners are breaking their projects into "bite-sized pieces" so they are easier to manage. As an example, one owner has broken his project into 26 different segments and has assigned a contractor to each segment who will be responsible and accountable for all the work in the segment. The company will manage the overall schedule and the interfaces.

Another owner plans to carve his project into chunks of $600 million to $1 billion and assign a company "silo" manager. They, in turn, will assign the "silo" to a contractor firm that is accountable for execution.

The owners know that the EPCM firms are the experts in this business and will rely on them to deliver on the plan.

F. Modularization

Linked to project segmentation, many of the owners plan to build the big modules that form part of the project offsite and haul them from southern Alberta. This way, they are closer to the source of skilled construction labour and they can build the modules in a controlled environment without the limitations imposed by northern Alberta winters. One owner will modularize 30 to 35 per cent of their project. This is expected to save time, money and enhance the quality of the equipment.

G. Technology Selection

For new and other types of projects, expect owners to be extremely diligent when looking for new technology. Utilizing new and unproven technology on mega projects has contributed significantly to project cost overruns. As one noted project management

analyst states, "the incorporation of new technology in a mega project almost ensures that the project will make more mistakes than money."[1]
However, owners are also challenged by the need to examine technologies that can reduce either capital costs, produce higher value products, address long-term operating costs, or meet enhanced environmental standards.

One future project owner has completed a detailed due diligence study of technology options for their process design. Task teams looked at an extensive list of upgrading, mining and extraction technologies. Their selection criterion was that the technology had to be commercially proven either today or by the time the project went into detail design, even if it meant choosing less "process-efficient" technologies.

H. Construction Owners Association of Alberta (COAA)
The COAA has 150 part-time volunteers working on five committees and 15 sub-committees looking at best practices for the construction industry. These committees include Safety, Construction Industry Performance (CIP), Rework, Workforce Development and Contracts.[2] In addition, the COAA sponsors research projects in a number of areas.

Each committee has numerous sub-committees that allow COAA volunteers to focus on improving industry practices. As an example, the Safety Committee has six sub-committees studying the following:

- Legislation and Policy;
- Best Practices – Safety Management;
- Education Training and Standards;
- Quality Workforce – Fitness for Work;
- Measurement and Evaluation; and
- Communications and Information Sharing.

Similarly, the Construction Industry Performance Committee has sub-committees studying Benchmarking, Workface Planning, and Rework.

The Workforce Development Committee is examining the areas of Supervisory Training and Qualifications, Apprentices, Opportunities for Women and Workforce Forecasting. The Rework Committee is focusing on Engineering and Reviews and Construction Execution Planning.

I. Education
Owners are pursuing a combination of formal training and practical experience to develop their employees' project management skills. Two owners are working together to create a project management school that will combine both classroom and hands-on experience functions.

5.3 Labour

To respond to the possible shortage of labour supply, industry, Government and other stakeholders have worked on a number of actions to ensure an adequate labour supply. These include:

A. Work Scheduling

In the interview process, the owners indicated they had tried several work schedules for the camp workers. Some were received more positively than others. The new schedule paradigm is not a 40-hour work week. Options being considered are:

- A 50-hour work week which is intended to spread the overtime over the life of the project. They are also considering the use of two shifts in the spring and summer to take advantage of the long daylight hours; and
- 10 days on, 10 hours a day and then four days off.

Due to the complaints from workers about using their personal time for travel to and from the work sites, one owner is building an airport and plans to transport workers by air to and from the site.

B. Managed Open Site Status

Some owners indicated their guiding principles obligated them to give all Albertans an opportunity to work on projects. One method used in the past was to sign "monopoly labour agreements" with unions. Instead, in what is call a "managed"[3] open site, some owners hope to hire union/non-union workers and have them all work on-site under the same terms and conditions.

C. Temporary Foreign Worker Program

In May 2004, the Alberta and Federal Governments announced an agreement to allow the temporary entry of foreign skilled workers to meet oil sands labour needs. The agreement outlines an expedited process to recruit and employ foreign workers. Industry owners will take advantage of this program by recruiting in Venezuela, India, China, Philippines, Hungary, Turkey, South Africa and other countries. The owners will apply for the recruits instead of the contracting organizations.

D. Petroleum Human Resource Study

The Petroleum Human Resources Council of Canada has issued an excellent study entitled, "*Strategic Human Resources Study of the Upstream Petroleum Industry*". It is an in-depth study that sought to identify:[3A]

- Workforce demographics, skills, supply and demand;
- Key human resources challenges of the industry; and
- The impact of technology and the business environment on human resources issues.

Their long-term plan is to define a human resources strategy for industry.

5.4 Co-Operative Initiatives

Industry and other stakeholders have formed a number of groups and initiatives to address the Fort McMurray and region issues and needs. One group that exemplifies the mutual efforts taken to respond to the challenges of Fort McMurray is the Athabasca Regional Issues Working Group (RIWG).

This group consists of representatives of oil sands developers and the Regional Municipality of Wood Buffalo. The main purpose of this group is to "provide a proactive process for the benefit of all stakeholders which promotes the responsible, sustainable development of resources within the Regional Municipality of Wood Buffalo."[4] RIWG:

- Facilitates planning for growth and effective and efficient resolution of issues;
- Involves all of the resource developers and affected stakeholders in planning; and
- Develops plans for sharing benefits with local stakeholders.

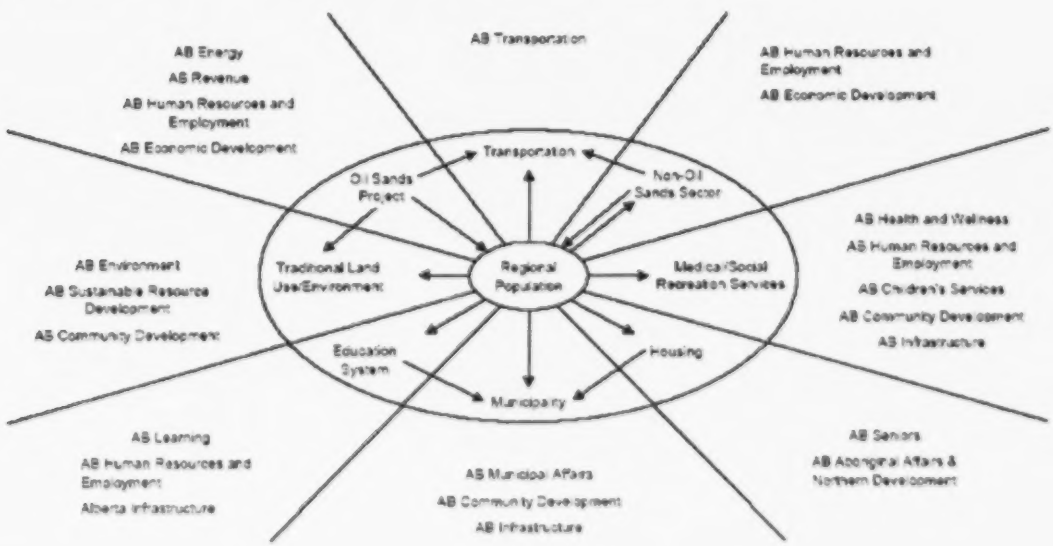
The group is working on a number of issues with the Alberta Government and other stakeholders aimed toward sustaining the growth in the Wood Buffalo Region.

5.5 Government Efforts

A. Background

The Government of Alberta has been intricately involved with Industry and other stakeholders regarding oil sands and mega project development. It has a holistic impact that affects numerous Government departments and sectors. Figure 5.2[5] details some of the oil sands impacts on the Provincial Government.

Figure 5.2 **Oil Sands Impact on the Alberta Government**



Source: Alberta Economic Development

There are a number of Government initiatives underway related to mega projects. A partial list includes:

- ***Capital Planning Initiative*** **–Municipal Affairs and other departments**
  This initiative is reviewing strategic infrastructure investment in the Wood Buffalo Region. To help respond to the pressures arising from the heated pace of oil sands development in the region (2005-2010 horizon), members are examining the needs for public infrastructure, such as affordable housing, provincial highway infrastructure, municipal infrastructure grants, education facilities, and health facilities.

- **Transportation – Alberta Transportation**
  Alberta Transportation is conducting a review of the overall infrastructure needs in northeastern Alberta.

- **Labour Market Information – Human Resources and Employment (HR&E)**
  HR&E has recently developed an occupational supply model they hope will facilitate improved labour market information for Albertans. Over the next six to eight months, they will be getting feedback from stakeholders in order to help validate and strengthen the model.

- **Long-Term (Ten-Year) Labour Force Strategy – HR&E and Other Departments**
  The Government is consulting with industry on this issue and will prepare a discussion document to enable further actions.

- **Foreign Workers Memorandum of Understanding – Alberta Learning and Federal Government**
  They have developed this program that targets the entry of temporary foreign workers to meet the urgent skilled labour needs of oil sands employers for key projects in Fort McMurray. Alberta will review and evaluate the credentials of foreign skilled trades people when notified by the employer.

- **Inventory of Major Alberta Projects – Economic Development**
  Economic Development lists major development projects in Alberta valued at two million or more that are planned, currently under construction or recently completed. The data is obtained from public information sources and is updated monthly.

- **Oil Sands Transportation Initiative**
  This is a project that is looking at linking the oil sands production area around Fort McMurray to Nisku, Alberta (south of Edmonton) with an improved and integrated road and rail transportation system. In addition to the private sector stakeholders, a number of Provincial Government departments are reviewing the study. A ministerial committee will also look at the recommendations.

- **Hydrocarbon Upgrading Strategy**
  A number of departments are working with industry to develop a business case for a world-scale integrated refining and petrochemicals cluster in Alberta. It is based on oil sands resources. They are developing an action plan.

- **Alberta Infrastructure/Alberta Construction Association Joint Committee**
  This initiative consists of a forum for conducting ongoing dialogue between representatives of the industry and the Government to ensure, to the extent possible, that in the provision of built infrastructure, industry receives a fair return and Government receives value for money.

In addition, the Government of Alberta has been working with industry, communities and other stakeholders in the Fort McMurray area regarding regional environmental management, such as the issue of cumulative effects. It is interesting to note that in AEDA's discussions with stakeholders, neither environmental issues nor Alberta Environment's regulatory processes were mentioned as contributing to mega-project cost overruns.

5.6 A Look Forward

The next chapter looks at the options and recommendations AEDA can make to move forward toward mega project excellence in Alberta.

Chapter Five Notes

1. Merrow, page 63, 64
2. COAA, http://cip.coaa.ab.ca/
3. A "managed site" is a site where both union and non-union contractors work side-by-side on the same project (each generally provides a different skillset or work on a different project element).

3A. The Petroleum Human Resources Council of Canada, "*Strategic Human Resources Study of the Upstream Petroleum Industry*", introduction letter.

4. The Athabasca Regional Issues Working Group; *Update on the Oil Sands Industry* Standing Policy Committee on Energy and Sustainable Resources; Bill Almdal, Executive Director June 8, 2004
5. Alberta Economic Development, *Oil sands Industry Update*, March 2004, p. 24

Chapter Six
The 30,000-Foot View
Analysis and Recommendations

A. A Call to Action

Alberta is fortunate to be home to a burgeoning economy that has the highest rate of economic growth in Canada. The Province is on the cusp of change in its hydrocarbon-driven economy as it evolves from conventional oil and natural gas to unconventional sources, such as the oil sands. By 2015, oil sands production will account for three-quarters of all western Canadian production.

Mega projects, such as oil sands, pipelines and power infrastructure, will require massive capital expenditures and will provide long-term revenues for Albertans. By 2030, potential cumulative capital spent on oil sands and oil sands projects in the Province of Alberta will be over $200 billion dollars. This does not include other major capital expenditures, such as those in the pipeline industry where it is predicted that some $10 billion will be spent on new pipeline infrastructure in the near future.

It is clear that Alberta's economic future is closely tied to the cost-effective execution of the Province's world-scale projects, such as oil sands development, petrochemical facilities and pipelines. Given the social and economic impact mega project activity will have on the future prosperity of Alberta, their effective execution is a legacy issue for Albertans. However, there are a number of issues surrounding mega projects in the Province that, if not acted upon, may endanger Alberta's future prosperity. This report details those issues and makes recommendations to move forward toward mega project excellence.

The following are the high level recommendations based on the interviews, research and analysis conducted for the project. The recommendations are just that – we have not detailed any project or action plans. These will be completed in the next phase of the project.

We recommend leaders across the Province begin immediately to move forward on these recommendations. **It is time for action.**

Recommendation Summary

Leader Engagement

- AEDA convene a *Centennial Summit*.
- Industry/Government convene a mega project stakeholder forum.
- Alberta Government develop a continuous cross-ministry committee to oversee an integrated government approach to focus on oil sands development.
- Stakeholders convene a Canadian Regional Forum – *Labour for the Future*.

Management of Projects

- Stakeholders establish a *Project Management Centre of Excellence (PMCOE)*.
- Owners need to establish a back-to-basics approach to project management within their individual organizations.
- Owners and EPCM firms continue to take advantage of existing project management educational opportunities.
- Owners and EPCM firms continue to increase workface planning at the job site.
- Stakeholders continue work to increase modularization capacity.

Labour

- Stakeholders develop a definitive and long-term labour supply and demand model for Alberta and the rest of Canada.
- Stakeholders develop a Human Resource Plan for Alberta.
- Stakeholders develop strategies to increase labour supply in Alberta:
  - Government help young people consider an oil and gas career.
  - Government, industry and labour promote trades in schools, K-12.
  - Optimize the use of apprentices in Alberta.
  - Optimize the existing labour supply.
- Owners continue to work together to balance project scheduling.
- Governments need to continue to break down the barriers for entry of foreign workers.

Infrastructure

- Government invest further in the Wood Buffalo Region to enable oil sands mega projects.

Communication and Outreach

- Owners manage expectations with the stakeholder community about the costs of mega projects and what determines the success of a project.
- Design a communication and outreach strategy about Alberta and mega projects for critical audiences, such as the investment community, media and Albertans.

6.1 Leader Engagement

1. AEDA convene a *Centennial Summit.*

Background

2005 is Alberta's centennial year, an appropriate year to assemble a vision for the next one hundred years. AEDA believes it is important to gather and engage leaders for a one-day strategic forum on Alberta's future – these are leaders from industry (CEO level), Government (Premier and selected cabinet members), post-secondary education (heads of post-secondary institutions), associations, academia, labour, finance, economics, communications and investment communities.

Objective

The objective is to engage leaders and have an open exchange of ideas and thoughts on the challenges facing Alberta in the next century. It is important that all deliberate and reach consensus on actions to which they can commit ideas and resources.

Topic Areas

The issues discussed would involve:

- An economic plan for Alberta;
- Energy needs for the next one hundred years (with a focus on the next fifty);
- Energy diversification;
- A business case for oil sands development;
- Mega projects' role in energy supply and the economy;
- Government cross-ministry plan – labour supply and demand, infrastructure;
- Capital expenditure forecasts;
- Educational opportunities and challenges; and
- Communication issues.

From this *Centennial Summit*, leaders will formulate an action plan and commit the resources to move forward in responding to the challenges ahead.

Who Will Initiate the Action?

AEDA will convene the leaders.

2. Industry/Government convene a mega project stakeholder forum.

Background

Many of the mega project issues require industry and Government collaboration. Through co-operation, they can bring a multi-perspective lens on issues such as project management and infrastructure. The issues they discuss should be used as a prerequisite to the Government/industry issues discussed at the *Centennial Summit*.

Objective
The objective for the forum would be to increase both Government and industry's understanding of the oil sands prize and the challenges to project management and community infrastructure.

These stakeholders could:

- Share information about the industry plans related to expansion of the oil sands and related investments;
- Share information about Government's plans related to meeting the labour force and infrastructure needs; and
- Create a business case that considers the issues of planning, project management, public infrastructure and the labour requirements.

Topic Areas
The issues discussed would involve:

- Benchmarking, data sharing, and the *Project Management Centre of Excellence* (see 6.2.1);
- Government and industry perspectives on infrastructure, capital spending, labour, and infrastructure; and
- Managing expectations with the public, the media and the investment community.

Who Will Initiate the Action?
We recommend industry work with Government to initiate this effort.

3. Alberta Government develop a continuous cross-ministry committee to oversee an integrated Government approach to focus on oil sands development.
Background
Building on initiatives already underway, and given that oil sands development is a legacy issue for Alberta and Albertans, the Alberta Government should assemble a cross-ministry (cabinet minister/MLA) committee to oversee a comprehensive Government plan for oil sands development.

Objective
The objective of this cross-ministry committee is to ensure that Government has a broad look at how all departments can enable mega project development.

Topic Areas
The issues discussed would involve:

- Capital investment in infrastructure, transportation and human resources;
- Capital investment by industry;
- Value-added opportunities;
- Technology and innovation;

- A plan for the Fort McMurray, Wood Buffalo Region; and
- Regulatory issues.

Who Will Initiate the Action?
We recommend the Ministers of Energy and Economic Development initiate the effort.

4. Stakeholders convene a Canadian Regional Forum – *Labour for the Future*
Background
Mega projects do not just affect Alberta. Alberta draws labour from Manitoba, Saskatchewan, British Columbia and the rest of Canada. At the same time, mega projects in B.C. (the Olympics) and the Yukon/Northwest Territories (Mackenzie, Alaska pipelines) will compete for labour and other resources with Alberta.

Objective
Since the mega project issue affects Canada as a whole, we recommend bringing together Government, labour and industry officials from across Canada to discuss the issue. The objective of the forum is to develop a Canadian labour supply and demand model.

Topic Areas
The issues discussed would involve:

- Labour supply and demand;
- A Canadian labour supply and demand resource model;
- Resourcing trade education; and
- Defining opportunities on how to work together efficiently.

Who Will Initiate the Action?
We recommend Alberta HR&E initiate this action in co-ordination with the Petroleum Human Resources Council of Canada

6.2 Management of Projects

1. Stakeholders establish a *Project Management Centre of Excellence (PMCOE)*

Background

Given that by 2030 the potential cumulative capital spent on oil sands and oil sands projects in the Province of Alberta will be over $200 billion dollars and given the importance mega projects have and will have on this province, Alberta needs a centre focused on managing mega projects. England (Major Projects Association), the U.S. (Construction Industry Institute CII) and the European Community (European Construction Institute ECI) have established organizations dedicated to improving major project management.

While there are a number of independent researchers and practitioners working on improving mega project performance, there is no Canada or Alberta equivalent to the American, British or European models. Filling this gap would help this province and industry improve project performance.

Benefits

To quote one mega project institution, their vision is that "development and adoption of improved practice in initiating and implementing major projects will have two benefits:

- It will benefit the promoters of major projects by delivering better value for their investments; and
- It will benefit the businesses which contribute to the delivery of major projects by increasing the value of what they do.[1]"

Subject Matter Areas

Alberta's PMCOE would focus on bringing industry, Government, EPCM firms, technology firms, finance, regulators, project management experts, Government and academia together to share the best each other has to offer in project management. The Centre of Excellence will act as an independent and confidential "clearing house" for project management. It would focus on:

- Databases
  - Sharing individual Alberta mega project costs
  - Benchmarking individual Alberta mega projects.
  - Confidentiality assured through the PMCOE.
- Executives and Project Management
  - Mega project management basics
  - Leadership and mega projects
- Mega project management basics
  - Project Life Cycle
  - Front End Planning
  - Design
  - Procurement
  - Execution

    - Operations and Maintenance
    - Contracts
- People Management
    - Leadership
    - Communications
- Academic/Industry interaction
    - Project team building
    - Project modeling
    - Research
- Best practices library
- Mentoring
    - Coaching
    - Job Placement

Who Will Initiate the Action?
We recommend a multi-stakeholder task force made up of owners, EPCMs, and Education initiate this effort. AEDA will identify the task force leader.

2. Owners need to establish a back-to-basics approach to project management within their individual organizations.
Background
As we mentioned in earlier chapters, due to the lack of mega projects and the downsizings that occurred in the 1980s, there is a lost generation of key players such as project managers. As a result, the experience needed to manage projects is currently in short supply and this led to missing some basics in the management of mega projects.

While interviewing and researching the causes of the mega-project overruns, we discovered that many of the root causes outlined were very similar to the analysis of root causes of cost overruns from past projects and analyst research. In one example called a *Conceptual Model of Cost Growth in Megaprojects*, the author indicated "the estimates themselves were faulty; project execution was faulty, causing costs to be higher (and schedules longer) than necessary; the project was changed – the thing estimated was not the thing actually built; and the macro environment – the "state of the world" – assumed by the estimator was unrealistic, resulting in changes in the project or input costs."[1A]

Those comments were written more than 16 years ago and are still applicable today. In one of our meetings, one owner discussed the issue of industry both researching and using the lessons learned. He summed it up this way:

> "There is lots of knowledge and lessons available. Learning, however, is not proportional to actions. With lessons, 70 per cent have good intentions, 30 per cent think about action and only 10 per cent have the discipline to do the real actions at the end of the day."[2]

We acknowledge that the industry is working on improving its project management performance – we believe, however, that they need to adopt and enforce the discipline required for effectively executing mega projects. In a study conducted by the Major Projects Association at Templeton College regarding learning from project failures, they summed up the difficulties of applying lessons learned:

> "Organizational learning is the ability of organizations—and people—to learn and change. It is far more complex than straightforward knowledge management. Identifying best practice is one thing: the hard part is achieving organizational improvement and getting people to apply the lessons of success and failure."[2A]

Objective
The objective is to adopt and enforce the discipline required for effectively executing mega projects.

Who Will Initiate the Action?
We recommend all mega project owners begin the back-to-basics approach. An enabling first step could be to create the *Project Management Centre of Excellence*.

3. Owners and EPCM firms continue to take advantage of existing project management educational opportunities.
Background
There are existing educational opportunities, such as the Project Management Institute (PMI) course, that stakeholders should utilize. PMI provides certification for employees to become Project Management Professionals (PMPs). In Alberta, there are approximately 1,000 PMPs. Other organizations, such as the Association for the Advancement of Cost Engineering International and the Institute for Supply Management, provide similar certification programs for project professionals.

Objective
The objective is to ensure all those involved in project management take advantage of the existing project management education opportunities.

Who Will Initiate the Action?
We recommend all mega project owners and EPCMs initiate the action.

4. Owners and EPCM firms continue to increase workface planning at the job site
Background
At first glance, this is the simplest (and perhaps eventually the most complex) way to increase labour supply in the Province. As we have shown earlier, an increase in 10 per cent of tool time is a 27 per cent improvement in productivity. A 27 per cent improvement in productivity translates into a 27 per cent decrease in a project's labour demand.

Objective
The objective is to increase labour productivity.

Who Will Initiate the Action?
We recommend mega project owners and EPCMs initiate the action.

5. Stakeholders continue work to increase modularization capacity.
Background
Interviewees indicated that preparing modules offsite is an innovative way to increase productivity since workers can prepare the modules in a controlled environment. Workers who are preparing modules do not need camps, buses, and other transportation and thus cost less.

Consequently, industry would like to increase its modularization capacity. To make this possible, the Wood Buffalo Region, the Edmonton area and southern Alberta will need to increase fabrication capability. Government will also have to enhance infrastructure to allow transport of the modules.

Objective
The objective is to increase labour productivity and reduce project costs.

Who Will Initiate the Action?
We recommend project owners and EPCMs take responsibility for the issue. Government will plan for infrastructure needs.

6.3. Labour

Labour in Alberta is perceived to be in short supply in the trades and within certain professional areas such as engineers, project managers and planners.

There is also an underlying concern about labour productivity. The issue is associated with the peaks and valleys of project activity in the short-term and health of the mega projects in the long-term since those projects need people to succeed.

On a broader basis, the perceived labour supply issue affects investor confidence in the Province. There are a number of labour recommendations.

1. Stakeholders develop a definitive and long-term labour supply and demand model for Alberta and the rest of Canada.

Background

Although there are indications of a labour shortage in Alberta, there are no definitive data that put together the supply and demand picture for Alberta. Given that Alberta draws upon and competes for labour from other provinces, it makes sense to widen this picture to include the rest of Canada.

It will require co-operation from labour, governments (provincial and federal) and industry to complete the data model. This involves co-operation from:

- Various labour organizations and associations to give their labour supply data;
- Co-operation from industry on the number and types of needed workers. If there is an issue of confidentiality, industry could supply the data and ensure confidentiality through industry groups such as COAA or through the Project Management Centre of Excellence; and
- Co-operation from governments to gather the data and provide the model to other stakeholders.

This needs to be part of the deliberation of the Canadian Regional Forum – *Labour for the Future* forum discussed in 6.1.4.

Objective

The objective is to establish a labour supply and demand model for Alberta

Who Will Initiate the Action?

We recommend Alberta HR&E, in co-operation with the Petroleum Human Resources Council of Canada, initiate this action.

2. Stakeholders develop a Human Resource Plan for Alberta.

Background

Once the model is complete, we can use the information so all stakeholders can plan effectively. This human resource plan should be part of the *Centennial Summit* outlined in 6.1.1 and the Canadian Regional Forum suggested in 6.1.4.

Objective and Business Case for Human Resource Planning
The business case for this model includes the following:

- It will give industry the ability to forecast its needs relative to supply. If there is a shortage in a certain area, industry can develop a plan to fill the gap;
- It will give the educational community the information it needs to align educational programs with business needs. This will help them plan their long-term funding needs;
- It will give labour the data necessary to adapt to emerging occupational trends and will result in employment; and
- It will give Government the data to be able to have a long-term vision of the future for the benefit of all Albertans. This would affect employment issues, educational resources and give Alberta the best chance to fill the labour needs of mega projects.

Who Will Initiate the Action?
We recommend Alberta HR&E and Advanced Education initiate the action.

3. Stakeholders develop strategies to increase labour supply in Alberta.
Background
Increasing labour supply will require joint efforts from all stakeholders. Government, industry, education and labour all need to play a role. It should be part of the *Centennial Summit* discussed in 6.1.1.

Philosophically, the effort needs an Alberta-first principle. Alberta needs to put Alberta first to ensure the legacy of mega projects continues to benefit Albertans directly through employment. Every effort needs to be made to promote mega project opportunities for Albertans.

Objective
The objective is to increase the labour supply in Alberta. There are long- and short-term levels of strategy:

Long-term
a) Government help young people consider an oil and gas career by adding energy to the curriculum.
Historically, the oil and gas industry has been viewed as a sunset industry. Alberta needs to change that mindset by adding oil and gas subject matter to the curriculum. This curriculum effort is currently underway.

Alberta Energy, through an organization called *Inside Education,* is working to further insert energy literacy into the curriculum. This effort needs to be continued, expanded and further adopted by Alberta Education, Human Resources and Employment and Alberta Innovation.

Grades 7-12 are an important time to promote work in the energy industry. However, there is little within the curriculum on energy in general and oil sands and other mega projects in particular.

Who Will Initiate the Action?
We recommend Alberta Education initiate this action.

b) Government, industry and labour promote trades in schools – K-12
Interviewees suggested there is a shortage of some trades people in Alberta. In fact, that is true across Canada with an estimated apprentice shortage of one million workers by 2020.[3]

Given this, the simple recommendation would be to promote trades within the system. That is currently underway by some contractor associations. However, there is resistance to the trades – parents tend to believe that university is the post-secondary school of choice. The data suggest that there is a negative perception among youth and their influencers that skilled trades involve hard physical labour, are dirty, less intellectually challenging, and provide less opportunities.[4] Further, the data[5] suggest that:

- While 60 per cent of parents said that they would be likely or very likely to recommend a career in the skilled trades to their children, 59 per cent of young people say that their parents have not encouraged them to consider skilled trades as a career option;
- Furthermore, 72 per cent of young people say their school guidance counselors have not encouraged skilled trades as a career option; and
- University is a first choice post-secondary option for 67 per cent of young people aged 13-24 and 55 per cent of adults, ahead of college and apprenticeship or trades programs.

Since increasing the number of trades people is important to Alberta's legacy, Alberta needs a broad communications strategy to explain the importance of trades and the benefits and lifestyle they offer. Alberta should direct the effort to the curriculum in Alberta in general and career counselors in particular. The initiative needs to capture the imagination of parents, future workers and children. One example of that type of idea was described in a recent article about a conference on attracting labour:

> "Rodger Evans, deputy chief executive of Construction Excellence in the U.K, who helped create the Bob the Builder cartoon TV show…helped change the public's attitude toward the construction business, legitimizing it…Bob the Builder's creator …has been supported by the U.K.'s Department of Trade and Industry, and it's now broadcast in more than one hundred countries."[6]

Who Will Initiate the Action?
We recommend Alberta Education along with a multi-stakeholder team composed of industry and labour initiate the action.

Short term

a) Optimize the use of apprentices in Alberta

Alberta has approximately 40,000 registered apprentices but only 5,000 plus completed their apprenticeship.[7] This is a four-year program that should be graduating more than 5,000 journeymen each year. If Alberta can reduce the program's attrition rate, there will be an increase in the skilled trades available.

Who Will Initiate the Action?

We recommend a multi-stakeholder group from Government, industry and labour initiate the action. Alberta HR&E should begin the initial meeting.

b) Optimize the existing labour supply

In a previous report, AEDA had four recommendations[8] that they believe when implemented will increase labour supply in Alberta. From the perspective of our study, these recommendations are valid and should be included in the strategy:

- Expand opportunities for marginal/disadvantaged Albertans to get the skills they need to join the workforce;
- Work with Aboriginal people to ensure that they have the education and skills to participate fully in Alberta's economy;
- Attract highly skilled people from outside Alberta and Canada to meet critical labour force shortages and
- Enhance access to post-secondary education and training.

Who Will Initiate the Action?

We recommend AEDA and Alberta HR&E initiate these actions.

4. Owners continue to work together to balance project scheduling.

Interviewees indicated that many of the problems encountered to date resulted from the simultaneous construction of competing projects. This included issues such as labour availability, infrastructure issues, increased costs, material availability, and project scheduling.

Labour interviewees indicated that while there are complaints of labour shortages, the reality is that there are labour employees (including apprentices) who currently are unemployed. The issue relates generally to the peaks and valleys of industry activity. This could be alleviated through load-leveling of projects.

Who Will Initiate the Action?

We recommend project owners continue to work together on this issue. This could be done through COAA or RIWG.

5. Governments need to continue to break down the barriers for entry of foreign workers.

Immigrants will be necessary for Alberta to have enough labour to enhance our economy. Their impact is dramatic. For example, during the 1990s almost one million immigrants joined the Canadian work force, accounting for 70 per cent of the increase in Canada's labour pool. Projections indicate that within a decade, virtually all growth in the labour force will be attributable to immigration.[9]

Alberta needs to work with the Federal Government to create a comprehensive and progressive immigration strategy that meets the critical labour demands of our Province. Earlier this year, Alberta Learning and the Federal Government developed a foreign workers Memorandum of Understanding. The program targets the entry of temporary foreign workers to meet the urgent skilled labour needs of oil sands employers for key projects in Fort McMurray. This program is looked upon by owners as a welcome "relief valve" for any labour shortages.

Similarly, the Alberta Government has a three-year pilot called the *Provincial Nominee Program* that fast-tracks skilled immigrants into the Province. It is being presented to the Alberta caucus to approve its expansion with the possibility of making it a permanent program.

At the same time, industry, labour and Government need to commit resources and support trade and professional associations as they work on accreditation of foreign professional and trades people. This includes "bridging" programs to allow foreign-trained professionals and other skilled immigrants to train up to Albertan/Canadian standards relatively quickly and avoid the need to start over. This will require dedicated federal funding, as well as close co-operation among governments, professional licensing bodies and employer groups.[10]

In a similar vein, consideration could be given to allowing foreign students enrolled in Canadian post-secondary institutions, and who obtain qualifications in fields where skill shortages exist, to apply for work visas after graduation.[11]

Who Will Initiate the Action?

We recommend Alberta HR&E, Education and Economic Development initiate this action.

6.4 Infrastructure

Background

Stakeholders in Alberta believe that Government has a role in providing infrastructure to further enable oil sands development. They detail two distinct aspects of infrastructure:

- The Wood Buffalo Region, including Fort McMurray – a key focus with comments about unaffordable (if available) housing and social issues; and
- Transportation issues such as roads and bridges from Calgary to Edmonton, Edmonton to Fort McMurray and Fort McMurray to the oil sands sites.

There is a strong case that the oil sands are Alberta's legacy. Accordingly, it makes sense to invest in infrastructure since that investment will reward Albertans many times over. It is also important to remember that this region will also create jobs and economic benefit to the rest of Canada (some 60 per cent of all investment benefits the rest of Canada—see Figure 2.5 in chapter 2.) The Federal Government has a role in investing in infrastructure in this area, much like they have in other areas of Canada.

The Alberta Government needs to complete the necessary analysis to examine the business case for the investment. The questions to consider are:

- What is the total capital investment in the region over the next twenty years?
- What is the impact to Albertans and Canadians and future capital investment if infrastructure is not improved?
- What is the integrated approach? What system can we devise to use roads, railroads and air routes to service the area?

The analysis also needs to consider southern Alberta's needs to ensure there are no bottlenecks in the transportation corridor that affect the region's ability to compete for work in the manufacturing and fabrication sector. Once this analysis is complete, the Alberta Government should devise a master plan with a twenty-year horizon that will consider how it will carry out the infrastructure improvements relative to the activity. Infrastructure needs from across Alberta compete for infrastructure capital – but this is a special case.

1. Government invest further in the Wood Buffalo Region to enable oil sands mega projects.

Objectives:

- Expand the present road system to Fort McMurray to an all-weather haul road for the transport of equipment, materials and modules from southern Alberta to the area;
- Examine infrastructure requirements (land, sewer, water) to allow the expansion of housing development in the Wood Buffalo Region; and
- Invest in the social infrastructure required, such as hospitals and schools.

Who Will Initiate the Action?
We recommend the cross-ministry committee referred to in 6.1.3 initiate this action.

6.5 Communication and Outreach

Background
Throughout the interview process, we heard many leaders indicate there was a lack of communication with the audiences that are important to Alberta's future. These audiences include:

- The investment community in Canada and internationally;
- The media;
- Albertans; and
- Canadians.

When we began the study, the perception of some was that the cost overrun issue contributed to weaker investor returns causing investors to question Alberta's long-term ability to sustain major project development. As a result, one of the outcomes asked of the study was to "create a positive perception of Alberta's ability to sustain world-scale project development." As we became more familiar with the subject matter and after some analysis, we realized there were a number of perceptions about Alberta and mega projects, many of which were not true. We examined those in chapter three.

At the same time, there was conflicting evidence about investor confidence in Alberta. While there was concern, its significance was overshadowed by the volume of investment funneling into the Province. We also expected to find a baseline study that detailed what investors thought of the Province since the assumption was they held a negative view of mega projects in Alberta. If we were to "create a positive perception", we needed this baseline information to measure against to determine if we succeeded. However, as we noted earlier, there is no baseline.

Stakeholders gave us mixed responses about the knowledge the investment community has about oil sands. On one hand, one senior level interviewee indicated that when he recently interviewed 25 New York and European lenders several months ago, only *one* was knowledgeable about the oil sands industry. Others indicated that the investors have a very good grasp on the Alberta oil sands and their business drivers.

1. Owners manage expectations with the stakeholder community about the costs of mega projects and what determines the success of a project.
As we discussed earlier in chapters three and four, many of the cost estimates for projects were completed prior to detailed engineering. That resulted in confusion about real project costs and impacted the reputation of mega projects in the Province.

Objective
To prevent confusion from recurring, owners need to better manage the expectation about costs with their projects. Prior to any announcements, owners need to develop a

communication strategy within their organizations to explain to external stakeholders the true nature of the costs and how they will be refined over time.

At the same time, both the media and investment community are focused on costs. Owners need to educate the public, the media and the investment community about other success criteria such as meeting safety, production and operability targets.

Who Will Initiate the Action?
We recommend owners through COAA implement this recommendation.

2. Design a communication and outreach strategy about Alberta and mega projects for critical audiences such as the investment community, media and Albertans.
Stakeholders inside and outside of Alberta are not as familiar with Alberta's role as an energy supplier as they need to be. All stakeholders (Government, industry, industry associations and EPCM companies) need to devise an outreach and communication strategy that will give key messages to the right audiences. Each has multiple roles. Government, for example, can provide the communication tools that industry can use to outreach to the investment community. Industry can give Government the tools and data it needs to communicate to Albertans. Both can work together in getting the correct information to the media.

Objective
The communication and outreach strategy will focus on:

- Alberta's role in providing North American energy
  - Energy Hub
  - Natural gas, oil, clean coal
  - Petrochemicals
  - Pipelines
- The oil sands and other mega projects
  - What they are
  - How oil is produced
  - The reserve base compared to rest of world
  - Pipelines, power generation
  - Tax, royalty regimes
  - How it can help meet North American energy security
- Mega project excellence
  - What stakeholders are doing on the issues of:
    - Project management
    - Labour supply/demand
    - Labour productivity
    - Infrastructure
- Finances
  - The difference between oil sands and conventional oil
  - The difference in risk/capital costs and financial modelling
  - The "prize"

There are many media that could be used in the outreach program. These include fast fact brochures, key message briefings, advertisements, promotions, videos and other products. Companies could use the tools during their road shows. Government officials can use them when visiting business leaders and governments outside of Alberta and Canada.

Who Will Initiate the Action?
CAPP and the Alberta Public Affairs Bureau should convene to discuss how to enact this strategy.

Chapter Six Notes

1. Major Projects Association
1A. Merrow, p. 21
2. Owner's meeting, July 22
2A. Learning from Project Failures: An MPA Seminar, Royal College of Pathologists, London on 13 November 2003
2B. *An Urgent Call to Action*, Report and Recommendations of the Jobs for the Future Committee, January 2004, p. 27
3. Conference Board of Canada, 2000.
4. Government of Canada, Government of Canada's Sector Council Program, http://careersintrades.ca/media/default.asp?load=fact
5. CAF-FCA/SCC poll conducted by Ipsos-Reid, 2004).
6. Industry faces labour shortage: Symposium to bring in world experts Calgary Herald, Nov 06, Section: New Homes, Kathy Mccormick
7. Apprenticeship and Industry Training, Government of Alberta http://www.tradesecrets.org/
8. *An Urgent Call to Action,* pages 24-27
9. *The work force needs an immigration fix;* National Post; July 29, 2004; Financial Post; Byline: Jock Finlayson
10. Ibid.
11. Ibid.

Appendix One

A. Project Mission

The mission of the project was to facilitate communication among, and develop strategies with, stak olders that will enhance Alberta's excellence in conceiving, designing, and cons.. . ting world-scale projects. This collaborative effort will help maintain long-term investor confidence.

B. Project Parameters

This project will focus on:

- World-scale projects long-term forecast from 2005-2025;
- Major projects over $500 million (Cdn.) in capital expenditures. Examples will include:
    - Oil sands upgraders/refineries
    - Oil sands mining/extraction and in-situ oil sand projects, including co-generation plants
    - Liquids pipelines connecting oil sources to markets.
    - Pipelines connecting Arctic gas to market including petrochemical complexes
    - Coke gasification to generate electricity.

C. Project Outcomes

i. Project Plan

- Develop a high-level project plan that will conceptualize and organize the project.

ii. Issue Analysis

By working and collaborating with stakeholders:

- Develop a better understanding of how stakeholders affect project costs;
- Determine how stakeholders currently measure project performance and make recommendations for improved project benchmarking;
- Identify sources of major cost variance in recent world-scale projects; and
- Identify what areas/actions have the greatest potential to reduce future project costs.

iii. Action Summary

- Identify and develop the actions that the industry, Government and other stakeholders are working on or will complete in the short- and long-term.

iv. Strategic Plan

- Develop a strategic plan that recommends the direction that industry, Government and other stakeholders should commit to in the short- and long-term to improve the economic environment of major projects in Alberta.

v. Investment Climate

- Create a positive perception of Alberta's ability to sustain world-scale project development.

vi. Communication

- Develop a project communication strategy that consists of:
  - Stakeholder outreach and education.
  - Key message development for Government and industry partners regarding actions dealing with cost overruns.
  - Marketing the AEDA strategy with all stakeholders to demonstrate actions developed on the cost overrun issue.
- Develop a broader, ongoing communication strategy with specific audiences:
  - Industry stakeholders.
  - Government staff and political levels – provincial and federal.
  - Albertans.
  - Investment community.

D. Project Methodology and Research

To engage, consult and solicit information from stakeholders, the AEDA team used a variety of communication mediums. These included:

- Workshops;
- One-on-one meetings;
- Group sessions; and
- Structured questionnaires and surveys.

In addition, with enormous help from the Southern Alberta Institute of Technology Library staff, the study team researched the issues and best practices surrounding mega projects and mega project excellence

E. Project Scope

The project involved the first two stages of a five-stage project management methodology. Details are as follows:

Stage One

Appraise **May 5 – September 17**

- Identify the stakeholders
- Define stakeholder issues through communication and collaboration
- Identify recent Alberta projects and select those for analysis

- Review post appraisals available for selected projects
- Analyze and look for trends and variances to identify root causes of cost overruns.

Select **September 17 – January 19, 2005**

- Identify options for strategy and action
- Provide solutions to issues
- Recommend specific actions
    - Draft report to AEDA – November, 2004

Define

- Each selected option will be defined for implementation.

Execute

- Implement defined options.

Operate

- Evaluate effectiveness of implementation

This project will complete the *Appraise* and *Select* project stages. Once these are complete, the Steering Committee will decide if they want to begin the other stages.

For each stage, the Project Team will present a decision support package (including a budget) to the Steering Committee.

F. Steering Committee Membership

The Project Team reported to a Steering Committee whose mandate was to:

- Represent AEDA;
- Provide ongoing direction to the Project Team on project scope and methodology;
- Provide to the Project Team a "gatekeeper" with authority to make day-to-day decisions;
- Aid the Project Team in getting access to interview candidates;
- Review progress reports and draft materials; and
- Communicate project results to respective stakeholders as appropriate.

The Steering Committee consisted of several members. Current members are:

Irene Lewis – AEDA – Project Co-Chair; President & CEO, SAIT
Allan Scott – AEDA – Project Co-Chair; President & CEO, Edmonton Economic Development Corporation
Doug Neil – Executive Director, AEDA
C.E. Shultz – AEDA; Chairman & CEO, Dauntless Energy, Inc.
Terry Gomke – AEDA; President & CEO, Gibson Energy Ltd.
Brant Sangster – Senior Vice-President, Oil Sands, Petro-Canada

The Steering Committee also received support from:

Mike Ekelund – Assistant Deputy Minister, Alberta Energy
Rick Sloan – Assistant Deputy Minister, Alberta Economic Development

Appendix Two

Organizations Consulted

Acres Parsons E&C Limited
Alberta Building Trades Council
Alberta Chamber of Resources
Alberta Economic Development
Alberta Energy
Alberta Energy and Utilities Board
Alberta Environment
Alberta Human Resources and Employment
Alberta Industrial Heartland Association
Alberta Infrastructure
Alberta Learning
Alberta Municipal Affairs
Alberta Transportation
AMEC
Athabasca Regional Issues Working Group
Bantrel Co.
CAL-ALTA Administrative Services Ltd.
Calgary Economic Development
Canadian Association of Petroleum Producers
Canadian Natural Resources Limited
Canadian Manufacturers & Exporters
The Collaboration Group Inc.
Colt Engineering
Construction Owners Association of Alberta
Dauntless Energy International Inc.
Edmonton Economic Development Corporation
Enbridge Inc.
Flint Energy Services Ltd.
Fluor Canada Ltd.
Gibson Energy Ltd.
Imperial Oil Resources
Inside Education
Independent Project Analysis, Inc.
Ipsos-Insight
Jacobs Canada Inc.
Ledcor
Lockerbie & Hole
MERIT Contractors Association
Mount Royal College
Nova Chemicals Corporation
Operative Plasterers and Cement Masons Local Union 222
Optima Engineers & Constructors Inc.
Opti Canada Inc.
PCL Industrial Management Inc.
Project Review and Analysis, LLC.
Revay and Associates Limited
SNC-Lavalin Group Inc.
Petro-Canada
Southern Alberta Institute of Technology
Shell Canada Ltd.
SNC-Lavalin Group Inc.
Suncor Energy Inc.
Syncrude Canada Ltd.
Synenco Energy Inc.
UMA
University of Alberta
University of Calgary
VECO Canada Ltd.